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COMPILED FROM

THE ANNUAL OF THE UNIVERSAL MEDICAL SCIENCES,
FROM 1888 TO 1894, INCLUSIVE.

BY

AUGUSTUS A. ESHNER, M.D.

With Copious Commentaries and Additions. Embellished by Wood-
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PUBLISHERS' ANNOUNCEMENT.

FROM the earliest publication of the ANNUAL there has been expressed, by a considerable number of the medical profession, a desire to obtain certain sections of the ANNUAL apart from the entire work. Compliance with this wish has heretofore not been deemed feasible, as one of the great advantages of the ANNUAL as a whole—viz., the three-column index of the entire work—would thus be lost. The publishers have, however, after due deliberation, decided to meet this demand tentatively, and this volume on "Fevers" is the application of that idea to the issues of the ANNUAL from 1888 to 1894, inclusive.

The several subjects that have been presented in the section on "Fevers" in the successive issues of the ANNUAL have been placed in chronological order, each department being harmoniously and consecutively arranged, with as little deviation from the original as possible, but with such additions and comments as seemed needful or desirable.

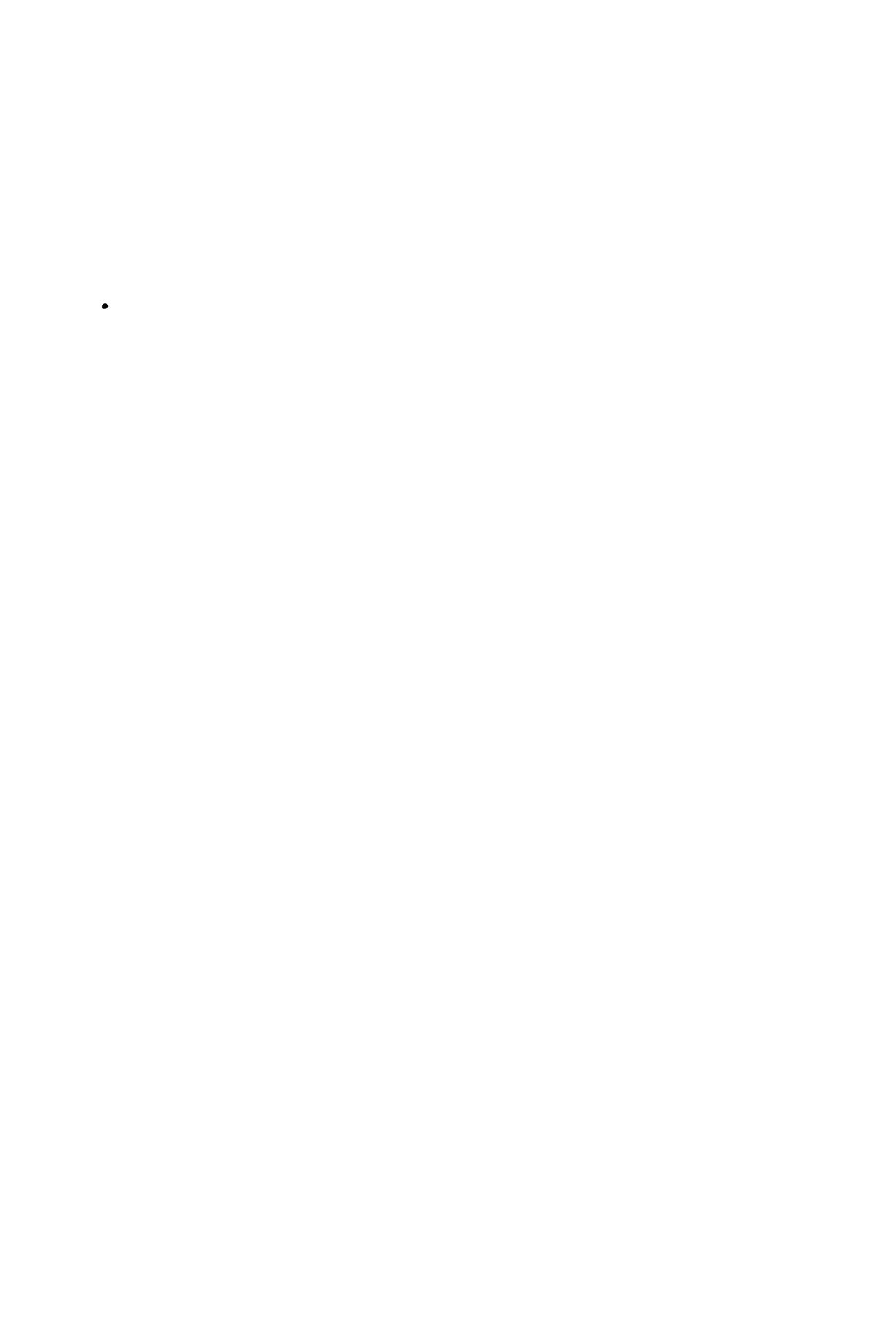
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It is the hope of the publishers that this book will form a useful and convenient work of reference. The ability to call the medical world in consultation for the consideration of the various febrile disorders and their treatment would seem to be an advantage that must commend itself to all practical physicians.

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FEVERS.

GENERAL CONSIDERATIONS.

(From the ANNUAL for 1888.)

GENERAL PATHOLOGY OF FEVER.

Macalister¹ reviews the existing theories and presents the doctrine of the nervous origin of fever in a form somewhat different from any hitherto definitely stated. Fever of necessity implies (1) a disorder of the thermotaxic mechanism; (2) an excessive production of heat, associated with excessive chemical changes in the tissues, the excessive production being more or less than that of a healthy person in full diet (perhaps often less than more), but more than that of a healthy person on fever-diet; and (3) that the bodily temperature, depending on the balance between production and discharge, fluctuates as one or the other is in the ascendant, and is not of itself a true measure of either or of the consumption of tissue that may be going on. The heat-production in the muscles, the chief producers of fever, is probably carried on under the influence of a twofold nervous mechanism: the one part exciting to thermogenesis, accompanied by destructive metabolism; the other staying thermogenesis and subserving constructive metabolism. The thermogenic tonus is the manifestation of the mutual balance between these two parts. The nature of the nervous mechanisms subserving heat-loss is paralleled by an analogous twofold character in the nervous mechanism subserving heat-production.

There is a certain order of progression observed in the disturbances of the thermal relations of the body. First and most easily disturbed is the thermotaxic nervous mechanism. If that only is deranged there result strange risings and fallings of temperature, as the independent variations of production and loss are concurrent or the reverse; but there need be no fever. The balanced rhythm of anabolism and catabolism in the muscles is not disturbed; there is no excessive oxidation and no excessive inhibition. This may be called thermal ataxia.

The next degree of disturbance is that in which there is not only thermal ataxia, but also disorder of the parts of the nervous

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The next degree of disturbance is that in which there is not only thermal ataxia, but also disorder of the parts of the nervous

system subserving heat-production; there is underaction of the anabolic nerves, with diminished construction and diminished absorption of energy; there is overaction of the catabolic nerves, with increased oxidation and thermogenesis. The net result is manifest wasting, or "combustion," and generally high temperature. This is ordinary pyrexia, and the nervous disorder does not generally go farther.

There is another stage, namely, when the mechanism of heat-loss is also profoundly disordered, so that the rise of temperature from the additional excessive thermogenesis does not stimulate it (or does not stimulate it enough) to meet the requirements of the latter, and the temperature reaches an excessive or even fatal height. This is hyperpyrexia.

Thus the thermal nervous system has three parts,—the thermotaxic or adjusting, the thermogenic or producing, and the thermolytic or discharging mechanism. Disorder of the first implies irregularity of temperature only; disorder of the first and second implies, in general, heightened temperature and increased body-heat,—that is ordinary fever; disorder of all three implies, in general, hyperpyrexia, dangerous increase of heat, and steadily rising temperature. In young mammals the thermogenic system is developed before the thermotaxic. The chief characteristic of an infant's temperature is its instability. As the child grows the range of its power of regulation increases, its temperature becomes stable, and the thermotaxic mechanism is evolved. Regarding the thermal mechanism as a functional and evolutional hierarchy, Macalister looks upon fever as a "dissolution," a progressive negative process, a relaxation of control from above downward.

T. J. MacLagan,² in an elaborate series of articles upon pyrexia and hyperpyrexia, contends that these two conditions, which have been linked together clinically and pathologically, and looked upon as degrees of the same condition, allied both in nature and causation, are essentially different in causation. The only band between them is the occurrence in each of a temperature higher than normal. The parts which go to form the thermal apparatus are (1) the tissues in which heat is formed; (2) the surface from which heat is eliminated; (3) a central controlling power in the brain (a thermic centre); (4) nerves connecting this

with the heat-forming parts of the body; (5) nerves connecting it with the heat-eliminating surface. The harmonious working of these different parts of the thermal apparatus gives rise to the phenomena of thermogenesis: and the general result is a persistent temperature of 98.4° F. Interruption of this harmony causes the temperature to rise or fall. There are two theories of fever with which we have to deal: (1) the combustion theory, according to which the rise of temperature results from increased activity of the process by which heat is naturally formed in the tissues; (2) the neurotic theory, according to which the rise of temperature is due to impairment of that inhibitory force by which the heat-producing process is kept within normal non-febrile bounds. These two theories are not antagonistic.

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The arguments by which the author's views are sustained is elaborate and ingenious. Especially ingenious is that portion of the paper in which he seeks to account in large part for the excessive waste of albuminous tissues and the excessive consumption of water in fever by the appropriation of nitrogen and water on the part of the contagion in its growth and reproduction within the body.

Austin Flint³ is disposed to take a somewhat more narrow view of the mechanism of fever. He regards the cause of pyrexia in essential fevers, for example, typhoid, as twofold: On the one hand an exaggeration of the chemical changes taking place in the

organism, by which, within natural limits, animal heat is generated; on the other, a disturbance of the processes of equalization of the heat of the body, mainly by the action of the skin. He regards water produced *de novo* in the economy as a product of excretion. The formation of water in health is mainly connected with the process of calorification. In fever the production of water seems to be diminished. His views are embodied in the following propositions, some of which are to a certain extent, novel:—

(1) It is probable that the original cause of most, if not of all the essential fevers is a microorganism, different in character in different forms of fever.

This proposition is based upon bacteriological researches of recent date, especially with regard to typhoid fever.

(2) Defining fever as an abnormal elevation in the general temperature of the body, the pyrexia is due to the following modifications in the normal heat-producing processes:—

(a) Oxidation of certain constituents of the tissues, probably by reason of the presence of microorganisms in the blood, is exaggerated independently of increased muscular work and without being compensated by a corresponding increase in the appropriation of nutritive material. This increased waste of tissue is represented by the excess of carbonic acid and urea excreted.

(b) The part which the formation of water within the body plays in the production of heat is either suppressed or is greatly diminished in prominence, together with the equalizing action of cutaneous transpiration.

This proposition is based upon clinical facts, which show an increased excretion of carbonic acid and urea, and a diminished excretion of water in fevers, and upon experiments which show that muscular work, while it increases heat-production, increases the production of water.

(3) Fever produces abnormal consumption of fat, with parenchymatous degenerations, for the following reasons :—

(a) The fat is consumed because it feeds the pyrexia more readily than do the other tissues of the body, and its consumption is the most important source of carbonic acid.

enchymatous degenerations of muscular tissue and of
is occur, chiefly because the abnormal transformations
which result in an excess of urea, and which prob-

ably, also, contribute to the excess of carbonic acid, are not compensated by the appropriation of nutritive matters from the blood.

(c) It is well known that patients with unusual adipose or muscular development are likely to present a more intense pyrexia in fevers than are those whose adipose and muscular development is smaller.

Finally. *An essential fever is an excessive production of heat in the body, induced by a special morbid agent or agents, and due to excessive oxidation, with destruction of the tissues of the body, and either a suppression or a considerable diminution in the production of water.*

Suppression or great diminution of cutaneous transpiration in the essential fevers, while it contributes, in a measure, to the rise in temperature, is not itself a cause of fever.

H. C. Wood⁴ summed up our present knowledge of fever and its antipyretic treatment in the following propositions:—

(1) Fever is a disturbance of calorification in which, through the nervous system, heat dissipation and heat production are both affected. If there be a fever which is produced by the direct action of a poison, independently of the nervous system, we have at present no proof of its existence.

(2) Heat production is regulated by a nervous apparatus, of which the knowledge is still imperfect. There is certainly an inhibitory centre which depresses or controls the production of heat. It probably does this by acting on the trophic cells of the gray matter of the spinal cord. It is also probable that there is a centre which, when excited, increases tissue change, but its existence has not been absolutely proven.

(3) Heat dissipation is regulated through the vaso-motor nerves, so that vaso-motor paralysis is followed by an enormous loss of animal heat, and, under unfavorable conditions, by death from cold.

(4) Drugs may lower bodily temperature in health and in fever by increasing heat dissipation.

(5) It is conceivable that there may be drugs which, instead of acting simply on heat dissipation through the vaso-motor system, act absolutely on heat production through the inhibitory nerve apparatus. A drug which acts upon the vaso-motor system, increasing heat dissipation, may be spoken of as a false antipyretic;

and a drug which absolutely influences the production of heat, may be spoken of for convenience as a true antipyretic.

Wood claims that we have at present no positive knowledge about the mode of action of any antipyretic drug, except perhaps quinine and antipyrine. We believe that aconite, veratrum viride, and drugs of that class are false antipyretics because we know that they cause vaso-motor paralysis, and it is therefore probable that they increase heat dissipation and lower temperature; but we do not know whether they have an inhibitory influence or not.

Collie⁶ does not definitely accept any of the views of the nature of fever at present entertained,—leaving the matter *sub judice*, with the statement that “before any theories can be formed of the pathology of the febrile state a clearer knowledge of the exact conditions which regulate and maintain the temperature in health must be acquired.” He regards the extremely sudden onset of some fevers, especially those of a malignant type, as strongly militating against the view that their cause is a multiplying germ: he sees in it rather the action of a paralyzing influence acting at once on the nervous centres.

Hobhouse⁶ regards the blood as one of the great instruments for regulating the body temperature; not as being in itself a heat producing agent, save indirectly and to that small extent to which metabolic processes actually take place in it,—which modern physiology is daily limiting.

Hösel⁷ insists upon the view that it is not the presence of micro-organisms in the blood, but the action of certain chemical substances resulting from the functional activity and multiplication of these organisms which constitutes the primary causes of fever. He formulates this view as follows:—“Fever is the result of intoxication of the nervous system by chemical poisons circulating in the blood; and in every disease attended by fever, this symptom should be ascribed to the factors which produce these poisons.”

Hösel arranges all febrile diseases from the stand-point of etiology, into two groups:—

- (1) Febrile diseases due to the presence of specific microbes.
- (2) Febrile diseases occurring without the introduction of specific microbes.

I. Febrile Diseases due to the Presence of Specific Microbes.

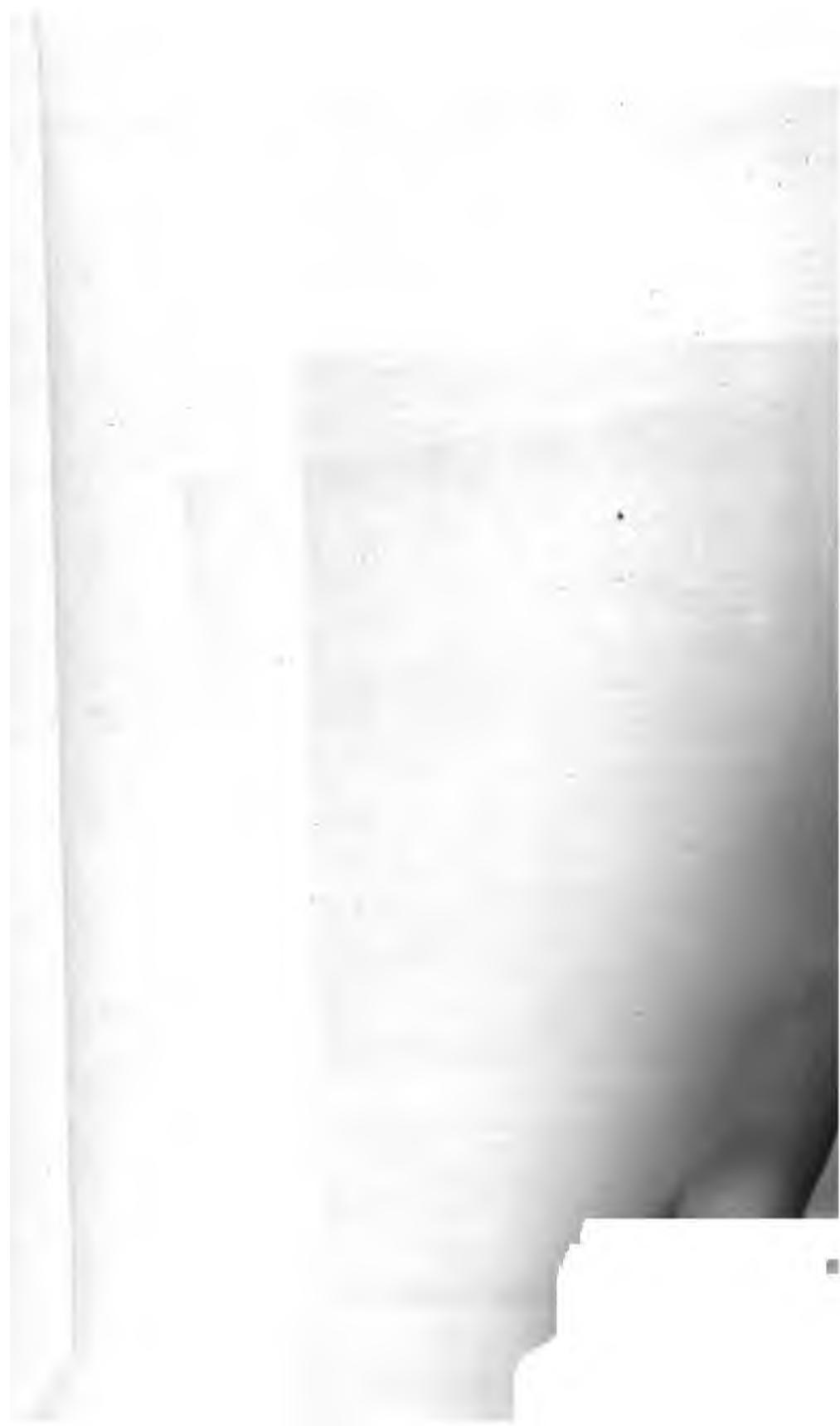
—We must first consider the manner in which micro-organisms, with their chemical products, can affect the body.

The primary effect of lower organisms which have found access to the body will be that of foreign bodies of any kind. [In what follows dead and living foreign bodies are separately considered.] They either remain or are at once gotten rid of. In the latter case they have little or no effect on the organism, and require in this connection no further consideration. If microbes remain in the body, there are two possibilities: they either find a favorable nidus and develop, or finding none they perish. We will consider the last condition first:—

(a) Dead microbes remain in the body. What happens? They are either after a time eliminated or they become encapsulated; that is, they act as dead and sterilized substances. Example: calcified tuberculous glands. The process is analogous to that by which a bullet becomes encapsulated or the encapsulation of trichinæ takes place.

(b) What takes place in other cases? Microbes remain in the body; find conditions favorable to their growth; undergo development, and produce chemical substances. They act as living foreign bodies. (1) At first only in the affected region or in the affected organs to which the microbes have gained access, are active chemical processes and the production of by-products possible. According to Virchow, the cells of the infected region tend to separate the intruders as foreign bodies. The body responds to the irritation with a local inflammation, of which the tendency is to cast out the microbes and their products. This may succeed, and microbes and ptomaines are directly gotten rid of. In this case we have to do with a local inflammatory process, but no fever. Example: local tuberculosis without fever.

(1) Pulmonary phthisis in later stage. Tuberle bacilli have become fixed in the tissues, have there excited inflammation, have produced chemical products, the nature of which is as yet unknown. These inflammatory and other products are, however, after breaking their way into a bronchus, voided in the sputum. (2) Local bone tuberculosis in later stage. After fistulæ have formed by which the microbes and their products find their way out of the body, there remains merely a local process: no fever.



We may therefore attribute certain fevers arising in the absence of specific germs to similar causes, and regard these forms of fever likewise as due to intoxication of the nervous system by chemical poisons circulating in the blood.

The Separate Forms of Fever.—A distinction is to be made between the intensity and the course of a fever. The intensity must be measured by the height of the temperature, the heart's action, the degree of constitutional reaction in general, etc. The course or type of the fever may be continued, remittent, intermittent.

The intensity and duration of a fever depend upon,—

(1) The productive coefficient of the microbe or of the organism itself.

(2) The degree of poisonousness of the products of metamorphosis.

(3) The capacity of the organs of elimination.

(4) The oxidative capacity of the organism.

The productive coefficient means the amount of chemical product, which a given number of microbes or the organism itself may produce in a given time.

The above factors explain all forms of fevers.

(1) Continued fever. The productive coefficient remains constant; elimination and oxidation diminished.

(2) Remittent and intermittent fever. Intermittent production.

(3) Lysis. Production gradually decreases. Elimination results slowly.

(4) Crisis. Production ceases at once. Elimination follows promptly.

(5) Hyperpyrexia. Uninterrupted rapid and abundant production and absorption, elimination diminished, etc.

(6) Death. Uninterrupted production. Arrested elimination.

(c) Handfield Jones⁸ collected an important series of cases illustrating the production of high body temperature in various anomalous conditions. He holds the view which he advocated ten years ago: "that while the actual generation of heat doubtless depends upon the combustion of protoplasm, the amount produced is regulated by the nervous system, or more exactly, by certain nervous centres probably located in or near the pons varolii."

Those who adopt this theory regard fever as a paralytic phenomenon. So markedly paretic are some of these disorders that accompany high temperature that Sir Thomas Watson wrote in his lectures the sentence, "Debility is an original and essential part of fevers." Jones thinks that fever motors affect the temperature centre in the same way as they affect the intellectual, muscular or any other centre; that is, they paralyze the nervous tissues to a greater or less extent. The assumption of the existence of a regulating mechanism for temperature is largely justified by a knowledge of a similar controlling mechanism in the case of the heart. Excessive rapidity of cardiac action is noticeably a paralytic phenomenon, just as pyrexia seems to be. He cites cases illustrating the instability of febrile temperature as compared with the stability of normal temperature under the influence of hot and cold applications, in confirmation of this view. Reflex or inhibitory paralysis and exhaustive or primary failure of nerve force are among the dangers of the thermic nervous mechanism and therefore demand consideration as among the factors of fever.

Sylva and Pescardo⁹ observed during the febrile period of several diseases a marked increase of electrical excitability of the cubital nerve. The difference was greater by the constant than by the faradaic current. This condition subsides under the action of antipyretics and upon the decline of the fever. The same effect is obtained by the bromides, which, however, in hysterical subjects appear to increase the nervous excitability. Zinc oxide gives uncertain results. Camphor at first weakens, then increases the excitability. Chloral, after a momentary increase of excitability, lessens it, while morphine, injected either in the neighborhood of the nerve or elsewhere, lowers it markedly. Pain lowers it and massage of the forearm for ten minutes markedly lessens it for some time. The continued administrations of the above medicaments does not affect the daily oscillations of nerve-irritability.

Bokai,¹⁰ as the result of an experimental study of the intestinal movements, reaches the following conclusions:—

(1) The constipation usually present in fever patients, which is also a result of lessened quantity of food taken, is better explained by the increased irritability of the inhibitory nerves of the intestine; (2) this increased irritability is dependent on and a result of the

FEVERS.

GENERAL CONSIDERATIONS.

(From the ANNUAL for 1888.)

GENERAL PATHOLOGY OF FEVER.

Macalister¹ reviews the existing theories and presents the doctrine of the nervous origin of fever in a form somewhat different from any hitherto definitely stated. Fever of necessity implies (1) a disorder of the thermotaxic mechanism; (2) an excessive production of heat, associated with excessive chemical changes in the tissues, the excessive production being more or less than that of a healthy person in full diet (perhaps oftener less than more), but more than that of a healthy person on fever-diet; and (3) that the bodily temperature, depending on the balance between production and discharge, fluctuates as one or the other is in the ascendant, and is not of itself a true measure of either or of the assumption of tissue that may be going on. The heat-production in the muscles, the chief producers of fever, is probably carried on under the influence of a twofold nervous mechanism: the one part exciting to thermogenesis, accompanied by destructive metabolism; the other staying thermogenesis and subserving constructive metabolism. The thermogenic tonus is the manifestation of the mutual balance between these two parts. The nature of the nervous mechanisms subserving heat-loss is paralleled by an analogous twofold character in the nervous mechanism subserving heat-production.

There is a certain order of progression observed in the disturbances of the thermal relations of the body. First and most easily disturbed is the thermotaxic nervous mechanism. If that only is deranged there result strange risings and fallings of temperature, as the independent variations of production and loss are concurrent or the reverse; but there need be no fever. The balanced rhythm of anabolism and catabolism in the muscles is not disturbed; there is no excessive oxidation and no excessive inhibition. This may be called thermal ataxia.

The next degree of disturbance is that in which there is not only thermal ataxia, but also disorder of the parts of the nervous

"The immunity acquired is to some extent handed down from one generation to another, and tends ultimately to ameliorate the character of the self-protective fevers."

Zweifel¹³ found that in various diseases of the stomach and in fevers the absorption by the gastric mucous membrane is retarded. His method of testing consisted in the administration of small amounts of potassium iodide 0.2 gram (grains iii) in capsules, followed by a draught of water, and testing for the appearance of the drug in the saliva, exceptionally in the urine. The presence of iodine is recognized by the red, then blue discoloration upon the application of a drop of hydrochloric acid to starch paper moistened with the saliva. In healthy persons the red color appeared on an average in eight and a half minutes, the blue in ten and a half minutes. The appearance of the drug in the urine was a little later. These observations related to the empty stomach. After the taking of food the absorption was much delayed. In fever the iodide is much more slowly absorbed than in health. As a rule the mere intensity of the fever has little or no influence upon the rapidity of absorption; yet it takes place more rapidly in a declining than in a rising temperature.

Nevin¹⁴ alludes to the diagnostic significance of the special odors which attend some of the infectious diseases. The odor of small-pox he states occurs only in the worst cases, and he ascribes it to ptomaines generated in the process of tissue necrosis. He speaks of a peculiar, sweet, almost aromatic odor of the breath observed in scarlet-fever patients, most marked in the early stages of the disease. Somewhat similar odors, which he states may be readily recognized, are noticed in typhoid fever and measles.

THE TREATMENT OF FEVER.

General Considerations.—Collie¹⁵ is a believer in the rational use of alcohol in the treatment of fevers. He says "whilst alcohol is sometimes a useful and sometimes an indispensable article in the treatment of acute diseases, it is not required in all cases." . . . "The quantity to be given in any particular case must vary widely. The age, sex, personal habits and history of the patient must be considered; his general condition as to strength or weakness, his appetite, his sleep or want of sleep, the condition of his mind and ¹ is idiosyncrasy as to alcohol. The nature of the disease will also

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The next degree of disturbance is that in which there is not only thermal ataxia, but also disorder of the parts of the nervous

of the organism or of articles of food, represented in the formation and discharge of nitrogenized excrementitious matters, carbonic acid and water.

(4) As regards its relations to general nutrition and the production of animal heat, water found in the body by a process of oxidation is to be counted as an excrementitious principle.

(5) Fever, as observed in the so-called essential fevers, may be defined as a condition of excessive production of heat, involving defective nutrition or inanition, an excessive production and discharge of nitrogenized excrementitious matters and carbonic acid, with waste and degeneration of the tissues, and partial or complete suppression of the production and discharge of water.

(6) Aside from the influence of complications and accidents, the ataxic symptoms in fevers, the intensity and persistence of which endanger life, are secondary to the fever and are usually proportionate to the elevation of temperature. These symptoms are ameliorated by measures of treatment directed to a reduction of the general temperature of the body.

(7) The abstraction of heat by external cold and the reduction of temperature by antipyretics administered internally, without affecting the special cause of the fever, improve the symptoms which are secondary to the pyrexia.

(8) In health, during a period of inanition, the consumption of the tissues in the production of animal heat, is in a measure saved by an increased production and excretion of water.

(9) In fever, the effects of inanition, manifested by destruction and degeneration of tissues, are intensified by a deficient formation and excretion of water.

(10) Alimentation in fever, the object of which is to retard and repair the destruction and degeneration of tissues and organs, is difficult mainly on account of derangements of the digestive organs; and this difficulty is to be met by the administration of articles of food easily digested, or of articles in which the processes of digestion have been begun or are partly accomplished.

(11) In the introduction of the hydrocarbons, which are important factors in the production of animal heat, alcohol presents a form of hydrocarbon which is promptly oxidized, and in which absorption can take place without preparation by digestion.

(12) Precisely in so far as it is oxidized in the body, alcohol

furnishes matter which is consumed in the excessive production of heat in fever, and saves destruction and degeneration of tissue.

(13) The introduction of matters consumed in the production of heat in fever, diminishes rather than increases the intensity of the pyrexia.

(14) As the oxidation of alcohol necessarily involves the formation of water and limits the destruction of tissue, its action in fever tends to restore the normal processes of heat-production, in which the formation of water plays an important part.

(15) The great objects in the treatment of fever itself are to limit and reduce the pyrexia by direct and indirect means; to limit and repair destruction and degeneration of tissues and organs by alimentation; to provide matters for consumption in the abnormal production of heat; and thus to place the system in the most favorable condition for recuperation after the disease shall have run its course.

Albert Robin,¹⁸ at a meeting of the Paris Biological Society, communicated further details of his researches on the subject of fevers. In typhoid fever, more especially, medicaments should be employed, which increase oxidation, such as oxygen, cold baths, cutaneous derivatives, chlorate of potash, the iodates and the bromates. Substances like sulphate of quinine and antipyryne, which diminish oxidation, should be avoided. Chlorate of potash, the iodates and the bromates, must be given very cautiously, owing to the poisonous effect of too large a dose. Robin thinks that they may be replaced by drugs which indirectly favor oxidation, such as alcohol, copious draughts of milk, etc. D'Arsonval stated that the results obtained by the use of cold baths as described by Robin, agreed with his own investigations on the temperature of animals. In animals, however, oxidation did not increase heat.

Dujardin-Beaumetz¹⁹ sought to revive the use of alcohol in the treatment of fevers in accordance with the principles laid down by Dr. Todd. In advocating alcoholic stimulation in fevers, Dujardin-Beaumetz lays stress upon the results of physiological investigations which have led him to regard alcohol as a tonic, an aliment and an antipyretic. To these conclusions the profession at large to-day yields only a qualified assent. While a large majority still contends that alcohol in carefully-regulated amounts is a tonic, the number willing to regard it as a food in the true sense, is not so

great; and finally those who admit it to be either a safe or certain antipyretic is very limited. Alcohol shows its antipyretic and its toxic effects simultaneously.

Glax²⁰ called attention to the fact that the ingestion of fluids is followed by an increase in the temperature of fevers. During fevers there is apparently a retention of fluid, and it is only upon defervescence that it is eliminated in quantity. The rise of body heat is in direct ratio to the accumulation of fluid in the organism; and Glax has found that a notable reduction of fever follows the withholding of liquids. His explanation is that the dilatation of the vessels which forms part of the febrile process permits the accumulation of water in the blood, thus favoring prolonged contact of the globules with the tissues and increasing oxidation. The facts upon which these conclusions are based require fuller investigation.

Semmola²¹ prescribes glycerine diluted with water as a drink in acute fevers. The formula is as follows: Pure glycerine, 30 grams; citric or tartaric acid, 2 grams; water, 600 grams.—M. Of this solution twenty or thirty grams to be taken every hour. It proves a very agreeable beverage, well borne by the stomach and not followed by intestinal derangement. Its free use is followed by a notable reduction in the quantity of urea excreted.

Hare²² has studied the influence of antifebrin, salicylic acid and carbolic acid on normal and abnormal bodily temperature. The objects of his research and the results will be found in the department of Experimental Therapeutics.

Finkler²³ observes that antipyretic treatment by baths must be given with reference to the laws governing nervous mechanism of heat and when thus given are of the greatest value. He believes that the drugs which directly influence fever have few grounds of real worth. He considers the combined use of baths and specifics as constituting the most efficient treatment.

Löwenberg²⁴ formulated the following general indications for the treatment of the infectious diseases:—

(1) To guard against further infection by the destruction of the infecting germs upon every accessible surface of the body and especially by the prompt evacuation and disinfection of the bowels; (2) an effort to eliminate, in part at least, pathogenic germs and their ptomaines by increased activity of the natural excretory

organs, as the intestines, the kidneys and the respiratory tract. (3) to increase the powers of resistance of the body and its organs by an abundant alimentation, by reducing the temperature by means of hydrotherapy and antipyretics, and finally by stimulation. In this connection it is probable that electricity will in the future prove of service.

Unverricht²⁵ formulated doubts which have been expressed by many clinicians, especially in Germany, as to the real benefit, not to say simply the curative influence, of antipyretic measures, and refers to Bauer, Pflügger, von Jaksch, Strümpell and Heubner as expressing doubts in regard to the positive views promulgated by Liebermeister concerning the disastrous influence of mere elevation of temperature.

W. P. Beall called attention to the fact that the dangers of high temperature in acute diseases may be overestimated. He believes that in the mere use of antipyretics we run a risk of paralyzing the heart.

Seay²⁷ regards the causes of fever as: (1) arterial contraction; (2) accelerated action of the heart; (3) increased tissue metamorphosis or oxidation; (4) probably a nervous influence causing an inhibitory action on the usual changes in transformation. He regards veratrum viride, aconite and gelsemium as valuable aids in the prevention of fevers.

J. R. Barnett,²⁸ of Neenah, Wisconsin, regards the salicylate of ammonium as among the more efficient of the antipyretics. As an antipyretic in fever marked by severe adynamia, it is among the safest on account of the ammonia base. It is stimulant as well as antipyretic, and therefore of itself fulfills indications otherwise only gotten by a combination of remedies. It is an agent of wide germicidal powers, being promptly efficient in affections of great etiological and pathological differences, each arising from its own proper specific micro-organism. As a remedial agent in typhoid and remittent fevers, it is unsurpassed, aborting them at the outset under favorable conditions, and greatly mitigating their severity and duration under circumstances less favorable.

Sullivan,²⁹ being favorably impressed with the theories and results presented by Barnett and Jackson, gave ammonium salicylate a careful trial, and draws the following conclusions from his personal experience:—

"Ammonium salicylate is certainly a very effective antipyretic. It will not reduce temperature as rapidly as antipyrin or antifebrin, but the antipyretic effect is more lasting than that produced by either of these agents." He cannot agree with Dr. Barnett that it is a stimulant, but is inclined to believe that in large doses, or in moderate doses long continued, it has a decidedly depressing effect upon the heart and respiration. This depression may, however, be avoided by administering the ammonium salicylate in combination with the aromatic spirits of ammonia. It has an irritating action upon the kidneys, and consequently should not be given in scarlet fever, or in any case in which these organs are not in a healthy condition. He is accustomed to prescribe it in doses of eight or ten grains every two or four hours through the first day, then at longer intervals, as the requirements of the case indicate. In some instances, thirty grains given in divided doses during twenty-four hours caused decided ringing in the ears, while other individuals bore a drachm in the same time with but little disturbance. To children three years of age it may be given in three grain doses every four hours.

Sydney Phillips³⁰ insists upon the importance of keeping up so far as possible the force of the heart's action. He suggests that the albuminuria of fever may sometimes be the result of diminished arterial tension, since Charcot has shown that albuminuria may result from delayed blood-flow through the kidneys. Hyperpyrexia should be anticipated by antipyretic treatment, which is especially to be employed to secure intermissions or remissions in the course of the fever when they fail to occur spontaneously.

Da Costa³¹ has directed the attention of the profession to the value of cocaine as a remedy in low fevers attended by nervous depression and weak circulation. Cocaine hydrochloride was given in doses of one quarter and even one half grain hypodermically every two hours. It is not clear from the account how long this treatment was kept up; but the results in his cases of enteric fever were very favorable. In this connection is to be taken the especial intolerance shown by many individuals for this drug, and the great nervous depression not rarely resulting from the use of small doses of it. Its administration must therefore in all cases be practiced at first with great circumspection.

Poulain³² recommends for loss of hair after fever, frequent sponging of the scalp with one grain of tartar emetic dissolved in one fluid ounce of distilled water.

Valenzuela³³ used air containing an excess of nitrogen in the treatment of fever. He compared its action in reducing fever temperature with that of cold applications, quinine, antipyrin, digitalis and arsenic, and concluded that the inhalation of nitrogen is the only method of treatment which is not followed by a rise of the temperature to its former height upon its discontinuance for a day. He also regards it as having a favorable influence upon the morbid process itself. Nitrogen was administered in two daily séances of half an hour to an hour in duration, beginning with air containing 17.76 per cent. of oxygen and gradually decreasing this proportion until at the end of the sitting it was only 12 per cent. A single case of phthisis was reported in which the fever ceased after the use of this treatment. Other cases are alluded to as having shown its beneficial effects.

Valenzuela has also recently made a series of interesting observations on the power of one volume of pure oxygen to affect the febrile state. He found that the temperature of healthy rabbits, after being kept an hour in pure oxygen at pressure varying from 760 millimetres to 1520 mm', underwent a marked fall, amounting in one case to as much as 11° F. Rabbits inoculated with septic material so as to induce pyrexia, suffered a marked fall of temperature by an immersion for one or two hours in an atmosphere of pure oxygen. In one experiment of two rabbits similarly inoculated, one which was bathed twice in oxygen of a tension seven times as high as that of the atmosphere, recovered, while the other, left untreated, died on the third day.

Mary Putnam Jacobi³⁴ concludes a very valuable communication on food and fever as follows:—

“ The ideal quantity of nourishment in fever would be that which might entirely cover the waste of tissue caused by the breaking up of fixed albumen. But this ideal quantity can never be given, owing to the multiple disturbance of the digestive organs. The mucosa of the alimentary tract is hyperæmic, or inflamed, or ulcerated, and abnormal fermentations are constantly sustained on the surface. As a consequence, fever patients always suffer from digestive disturbance, of which the mildest is anorexia; but to this

may be added nausea, vomiting and diarrhoea, of all degrees of severity. Food, therefore, in acute febrile diseases, must be prepared for speedy absorption: it must be liquid; and often it must be artificially digested. The meat solutions of Liebig and Rosenthal, and preparations of peptones, as that of Rudisch, are the most suitable forms of artificially digested albuminous food. Instead of sugar it is desirable to give glucose. There are no means of digesting fat, and this must be avoided in fevers, from its tendency to decompose into acrid compounds. The nutritive value of gelatine has been the subject of prolonged and learned controversy. It certainly cannot replace the fixed albumen of tissues, and thus is inferior to peptones, which have been shown to do so. But gelatine is a nitrogenous substance, which is destroyed in the organism with great rapidity, and gives rise to a proportionate amount of urea. It can therefore, to a certain extent, serve to spare albumen. One hundred grams of dry gelatine contain 17.3 grams of nitrogen; 163 grams of dry gelatine originate as much urea as 84 grams of dry albumen. In the formation of urea, physiological processes are instituted of at least temporary value in nutrition. These considerations justify the use of jellies and also of soups in fever. Inorganic salts are no unimportant part of necessary food. They are necessary to the assimilation of food by the tissues, and to the elimination of waste products from them. An excess is always eaten, and eliminated by the urine. The effect on osmosis is most marked with chloride of sodium, but is noticed with all salts. Bouillaud was in the habit of treating typhoid fever patients—having first bled them largely—almost exclusively with table salt. In large doses this substance has some degree of antiseptic action in the intestines. Mucilaginous drinks are always suitable in fevers, although it be unnecessary to ascribe to them the traditional virtues of the French tisane. Alcohol is to be considered rather as a food than a drink. In small doses alcohol is certainly decomposed and oxidized like any carbohydrate substance; thus, in doses of four ounces and less in the twenty-four hours. Above this limit, with considerable margin of variation in the individual case, alcohol is eliminated unchanged; and this quantum, as a special stimulant of the heart and nerve tissue, is therefore a medicine and not a food."

Francis Duffy,³⁵ in an essay on alimentation in continued

fevers, to which the Medical Society of the State of North Carolina awarded a prize, makes an admirable plea for moderation in fever feeding. It is only in health that the fundamental processes of nutrition—viz., digestion, absorption and assimilation—are completely performed. The idea that the increased destructive metamorphosis incident to the fever process calls for increased nutrition would, from a superficial view, appear to be theoretically correct; but as a matter of fact it is impracticable. The rapid molecular death of the tissues under the influence of high temperature and the complexus of chemical and vital phenomena which make up the fever process, is incompatible with great tissue-building to an almost prohibitory degree and the digestive laboratory is crippled and incapacitated for performing its functions. We cannot rebuild the new edifice while the old one is yet in flames. If, when gastric digestion is suspended, albuminoid substances are artificially converted into peptones, absorption is not assured. If accomplished on the principle that any liquid would be taken up by a thirsty soil, the other, and crowning act of nutrition—that is, assimilation—can only be performed in a limited degree; and the blood, already burdened with waste products of the body, is further charged with the disposal of the excess of alimentary principles. Retrograde metamorphosis goes on in the blood, and the amount of urea excreted represents not only the tissue waste, but also the waste of alimentary principles,—peptones not converted into tissues. He regards the large amount of milk administered to fever cases by many clinicians, and particularly by Loomis, as injurious, and agrees with Fothergill as to the advisability of using the carbo-hydrates rather than the albuminoids. In deference to Fothergill's advocacy of grape sugar and glucose, as well as to the desires of fever patients, he has used the juice of ripe grapes, and has had on no occasion cause to regret it. Food should be administered only in such quantities as are capable of digestion and assimilation. If a patient without the power of digestion has a conservative loss of appetite, is it not equally true that a patient without powers of assimilation has a conservative loss of digestion?

Dujardin-Beaumetz³⁶ follows a discussion of the historical aspect of the question of alimentation in fever by practical observations on the teaching of modern science. One of the first con-

sequences of fever is a diminution or even a chemical change in the digestive secretions. In fever the digestive apparatus is diseased and the intestinal juices are much diminished. The peptonization of albumen and the emulsification of fats are not properly brought about. Liquids are capable only of resorption. Fever-patients invariably lose weight. The loss takes place through the excretory organs, the lungs, intestines, kidneys and skin. As the resorption of anything but liquids and fats is almost *nil*, the first rule must be to give fever-patients nothing but liquids. Milk and bouillon are most available. The water and salts undergo a ready absorption. The fate of the albuminoids and fat contained in the milk has not yet been determined; it is probable that they are little if at all used. As regards alcohol, in the case of children, old people, and drinkers, its administration in the form of wine is often useful and sometimes indispensable. As regards its physiological value, there is much difference of opinion. According to some it increases the vital powers; according to others it reduces temperature; according to others, again, it acts as a sparing agent; and, lastly, some authorities regard it as a food. It is possible that it acts to some extent in all these directions. These, then, are the proper articles for the alimentation of fever-patients,—milk, bouillon and wine. Dujardin-Beaumetz does not, like Nothmagel, recommend broths, soups, and eggs, nor is he in favor of such an early return to solid food as are the Germans. Patients, he thinks, should not be allowed the use of solid food in the period of convalescence so soon as they become eager for it.

Nevin³⁷ regards the proper treatment of fever as purely dietetic, and, in view of the part played by the nervous system in the mechanism of fever, as purely calmative. Under the latter heading are to be mentioned good nursing, the removal of irritation, and means to lower excessively high temperature.

GENERAL CONSIDERATIONS.

(From the ANNUAL for 1889.)

The journal contributions on this subject during the year have been numerous and important. The admirable papers by Macalister, Austin Flint, H. C. Wood, and others, referred to in the ANNUAL for last year, excited very general renewed interest among pathologists in the mechanism of fevers; the recognition of the part played by ptomaines in the causation of fever has also given a new impetus to the scientific study of the febrile infectious diseases. The prevalence of local epidemics of enteric fever in France has led to important and fruitful investigations into the rôle of the water-supply in the causation of this disease and to active discussion of its treatment; while, finally, the epidemic of yellow fever, which, having showed itself at Tampa in 1887, broke out extensively and disastrously at Jacksonville and elsewhere in Florida during the past summer, has turned the attention of physicians to the investigation of the causes and treatment of this disease. To these influences must be largely attributed the remarkable activity shown by the profession in this department of clinical medicine during the past year. Much of the work is chiefly of historical interest, as embodying records of facts observed on a more or less extensive scale. A considerable part of it is of value as setting forth new views and supplying confirmatory evidence of the correctness of the results of recent observations, and it is creditable to the profession that a small proportion of it only has been poured into traditional molds of imperfect observation and conjecture.

General Pathology of Fever.—The neurotic theory of fever is the prevailing doctrine. Almost without exception, authors look upon disturbance of heat-regulation as the initial step in the pathological process. The cause of this disturbance may be an impression,

direct or reflex, upon nerve-centres, or a morbid agent circulating in the blood, produced within the organism itself, or introduced from without. Animal alkaloids, whether putrefactive (that is, results of the life activity of microbes) or the result of normal or abnormal metabolism, and non-alkaloidal ferments normally present in the economy or arising from perversion of normal processes, are the principal intrinsic pyrogenic agents. Pyrogens may also be introduced with food, but of extrinsic agents, micro-organisms, whether directly pathogenic, or giving rise to chemical changes which produce the pathogenic agent, are still considered the most important. On the one hand, the fact of increased oxidation of tissues not to be accounted for merely by elevation of temperature, and on the other hand the connection between simple pyrexia and respiratory and circulatory disturbances, seem to have been confirmed by more or less carefully conducted experiments. Researches into the alterations of tissues and fluids show that fatty degeneration of muscular tissue may be produced by heat, though not to the extent formerly supposed; while evidence as to the structural changes in non-muscular organs is conflicting, both as to nature and causation. The state of the blood seems to vary in different diseases, hence presumably with the nature of the pathogenic agent. The difference between thermometry and calorimetry is more and more emphasized, and conclusions drawn from temperature curves become consequently more and more guarded. Finally, the Hippocratic doctrine that fever is a protective effort of the organism against its enemies is more or less positively advocated by many writers in various terminology.

Welch,⁹⁹ Apr. 6, 1880 in a careful and critical review of all the evidence, recognizes fever as a complex process, though he would prefer to limit the term to elevation of temperature. There is both increased heat production and increased heat loss. The temperature at any time, depending on the ratio between these processes, fails to indicate the actual energy of either. In the early stages, production predominates; in defervescence, loss prevails, and in crisis may be threefold the normal amount. Fluctuations, specially irregular in heat loss, qualify the value of a general statement. Augmented oxidation is an essential part of the febrile process, indicating increased heat production, and is not merely the result of elevated

ure. No great importance can be attached to the persist-

ence as heat of energy normally applied to work (Ord's hypothesis). Recognizing in muscles and glands the principal sources of body heat, all thermogenic phenomena may be found, as pointed out by MacAlister, to depend upon the action of katabolic (thermo-excitatory) and anabolic (thermo-inhibitory) nerves. The symptoms of fever point to disturbances of both sets. No definite conclusions can be drawn from experiments upon nervous centres except that injury of a circumscribed definite region of the brain may excite fever independently of the presence of pyrogenic agents in the blood. Welch punctured the caudate nucleus in rabbits; determining, in addition to confirmation of the results of previous observers, that the power of heat regulation is lessened. He sees no reason why the condition should not be called fever. This experimental evidence of the possibility of a purely neurotic origin of fever is confirmed by the clinical cases collected by White.⁴²⁸ To determine the relation between increased temperature and the various disorders of bodily function, and in how far high temperature in itself, independently of infection and other disturbing elements, is dangerous to life, Welch conducted a series of experiments upon rabbits, in a large heating-box, constructed to afford ventilation and other favorable conditions. Having succeeded in keeping alive for three weeks two large black rabbits with an average rectal temperature of 107.3° F. (41.8° C.) and 106.6° F. (41.4° C.) respectively, he concludes, with some reserve in the application of his results to man, that human beings may tolerate temperatures of 107° F. (41.7° C.), or even higher, for a considerable time. This inference is supported by clinical observations, especially in relapsing fever. He notes, too, the occurrence of a critical temperature, about 108°–109° F. (42.2–42.8° C.) in his experiments, at which sudden and fatal further elevation occurs, apparently from paralysis of heat regulation.

Hyperpyrexia in human beings may doubtless be susceptible of similar explanation. Different animals, moreover, differ in their power of tolerating temperature, and the normal resistance of any individual may be weakened by various causes. Infection may thus lower resistance; and while in some cases a moderate or even a great elevation of temperature may be comparatively harmless, in others the system may be placed in such a condition by other factors—*infection*, for example—that high temperature under

these circumstances becomes a source of danger. With these restrictions, Welch asserts that febrile temperatures do not in themselves exert the injurious influences usually attributed to them. The only functional disturbances directly attributable to high temperature are increased frequency of pulse and respiration. The rapid respiration is due partly to reflex stimulation from peripheral effect upon the skin, partly to action of warmed blood upon the respiratory centres. The quickened pulse is shown by experiments of Martin to be due to the effect of the heated blood upon the heart itself. While prolonged high temperature will produce fatty degeneration of the heart (as of other organs), yet other factors are concerned in this lesion, and it may exist without serious impairment of cardiac function. Increased consumption of tissue is but partially due to high temperature. Lessened perspiration, renal and digestive disorders are likewise referred largely to other factors, while intoxication rather than high temperature is looked upon as the cause of sensorial disturbances.

Three groups of pyrogenetic agents are described. The first consists of certain substances which have no necessary connection with micro-organisms, and which are either not foreign to the organism or are readily formed within it by unorganized ferments. Ferment intoxications and aseptic traumatic fevers are instances of fevers produced by this class of agencies. The second group includes substances that result from putrefactive decomposition brought about in the body itself or in food substances taken into the body by the action of bacteria not in themselves pathogenic. The third and most important group of fever-producing agents is formed by the pathogenic micro-organisms. In some cases we have evidence that these likewise act by producing poisonous substances within the body. We are not warranted, however, in concluding that such is their only method of action. It is possible that the three groups of substances described may act mediately to produce within the body one and the same active agent. Independently of these causes, heat exposure may give rise to a special form of thermic fever. Tetanus is due in some cases to a bacillus, in other cases the cause of the disease and its fever are undetermined. Purely nervous fever or neurotic pyrexia may exist in organic disease and in hysteria, or as a reflex neurosis, as in some cases of catheter fever. The doctrine of evolution

indicates a protective tendency in a process which characterizes the reaction of all warm-blooded animals against the invasion of an enemy, and we are justified in believing that fever-producing agents light the fire which consumes them. It is not inconsistent with this view that the fire may require the controlling hand of the physician to prevent injury to the patient.

Vincent¹⁸⁸ _{sub.5} reports the results of more than thirty experiments upon animals subjected to overheating, either by exposure to the sun or in a heating-box. His apparatus was carefully constructed to avoid all sources of error in the experiments or in their automatic records. Warm-blooded animals, such as dogs, died when their temperature reached 45° C. (113° F.); death occurred three or four hours after the temperature of the heating-box reached 37° to 38° C. (98.6° to 100.4° F.).

Rabbits exposed to the sun (34° C., 93.2° F.) died in about one and a half hours at the same average temperature, 45° C. (113° F.). The temperature may remain stationary at first, or even be depressed during the first half hour, after which it rises gradually and regularly until within the last half hour before death, when the increase becomes more rapid. In one case the rise continued *post-mortem*. Agitation, cries, and moans accompany the rise of temperature. At 41° or 42° C. (105.8° to 107.6° F.) the distress becomes extreme; a little later it ceases, and little by little the animal falls into coma more or less profound, interrupted by violent convulsions, general tetanic spasms, trismus, or at times clonism. The hyperæsthesia of the period of agitation gives place to complete anaesthesia. Reflexes in general are abolished, but the pupil reflex is manifested more or less, save in the last moments of life. The corneal reflex is the most constant. Microscopic examination of the sciatic, tibial, phrenic, and pneumogastric nerves showed no lesion, permitting the cause of the phenomena to be ascribed to the nervous centres. Interesting plates illustrating respiratory disturbances are given. The frequency of respiration is regularly but rapidly accelerated with the increase of temperature, reaching successively one hundred, two hundred, two hundred and fifty, and two hundred and ninety inspirations in the minute (*thermic polypnaea* of Richet). In one case it reached six hundred. Having attained its maximum, the rate of respiration declines gradually from forty to thirty inspirations

per minute before it is arrested. The animal dies in expiration. Amplitude is in the inverse ratio to frequency; but at times there is prolonged arrest—veritable respiratory syncope—which may last for thirty to fifty seconds. Restoration occurs gradually. Cardiac syncope may take place simultaneously. After this period of apnoea a new respiratory type is developed, tending at last to become feeble, slow, and labored, but a very small quantity of air entering the lungs. Various abnormal types of respiration are described and illustrated, showing a true respiratory ataxia, *i. e.*, a defect of co-ordination in the centres manifested by excitement of function followed by failure. In connection with the phenomena of general excitement, followed by depression and coma, we are forced to the conclusion that there exists disorder of the cerebro-spinal nervous centres, especially the medulla. Observations upon the absorption of oxygen show that it augments with the temperature, whether this be suddenly or gradually increased, diminishing somewhat in the period immediately preceding death. Disregarding details, the same animal in a normal state absorbed one litre of oxygen in five minutes thirty seconds; and, exposed to heat, absorbed one litre of oxygen in three minutes and four seconds, or at a rate nearly double the normal. The rate of cardiac pulsation rises gradually with the temperature, but without attaining any remarkable elevation. With temperature of 42.2° C. (108° F.) and respiration of one hundred and eighty the pulse-rate would not be greater than eighty-four. The maxima of pulse and respiration curves do not correspond. When the latter is at its fastigium the pulse oscillates between one hundred and thirty and one hundred and forty. In the last half hour before death sudden and rapid increase of pulse occurs, reaching a rate of two hundred and thirty to three hundred or more. A rate of from one hundred and twelve to one hundred and fifty-two is maintained up to one minute before death. Respiration ceases twenty seconds to two minutes before the heart is arrested in systole. Arterial pressure is not diminished until the animal is in death throes. Just before death, when the non-oxygenated and highly carbonized blood excites the medulla, the blood pressure, though greatly diminished, rises two or three centimetres, but descends rapidly to zero. General vascular dilatation is ascribed to paralysis of vaso-constrictors, and is believed to explain the fact that the temperature of the animal

becomes so much greater than that of the heating-box—an explanation the editor of this department cannot accept, in view of our present knowledge of heat regulation.

Microscopic examination of the blood showed only slight crenation of red cells in animals which died in the heating-box—those exposed to the sun did not show even this. The disorganization of globules and transudation of plasma described by Litten was not found. The number of blood-cells appeared to be increased, but this was entirely relative, due to concentration of plasma from the great evaporation from the pulmonary surface and the skin. For the same reason an apparent increase in haemoglobin was noted. No alteration in the gaseous constituents of the blood could be satisfactorily demonstrated. Certain toxic principles were found by physiological reaction to have been developed in the blood, some having a narcotic action, others giving rise to convulsions, still others possessing mydriatic properties. Autointoxication with these substances (leucomaines and decomposition products) is favored by the anuria which results from high temperature. Coma and failure of the medullary functions, and, indeed, all other morbid phenomena of hyperpyrexia are believed to be explicable by the action of these toxic agents, themselves the result of heat.

Anderson²³⁴ rejects micro-organisms as a cause of disease, on the ground that disease must exist before the micro-organism can do harm. Referring to Benjamin Ward Richardson's observations of twenty years ago, he considers that "fever, like pain, is an outward expression of internal derangement," caused by "improper food or drink, sudden changes of temperature, exposure to dampness or cold, overpowering heat, atmospheric changes, specific ptomaines, whether imbibed, inhaled, or generated in the system." Many diseases ordinarily mild may by improper treatment or neglect become malignant and infectious through the development of ptomaines.

Maragliano^{235,236} has studied the behavior of blood-vessels in fever and in antipyresis. He distinguishes between Traube's and Marey's theories of vaso-constriction in fever, on the ground that in the former this is the primary and important phenomenon, while in the latter it is regarded as secondary to an initial dilatation. By the aid of Mosso's water-plethysmograph, it was determined that

vaso-constriction precedes elevation of temperature; that as the constriction progresses the temperature rises; that the temperature and constriction reach their maxima together; that temperature begins to fall before there is any dilatation of the vessels; and that fall of temperature and vaso-dilatation then progress together, reaching normal at the same time. Chill ensues when the constriction of vessels becomes marked and continuous. Antipyretic measures lower temperature in so far as they cause vaso-dilatation, and when their antifebrile power is exhausted, and the temperature rise recurs, this new invasion is always preceded by vaso-constriction.

Chelchowski ⁵²⁰_{V.B. No. 10, May 15} ¹³ considers slowing of the pulse in convalescence from acute fevers to be due to degeneration of the striated muscular fibres, throwing certain chemical products into the blood, which affect the heart. It is of good prognostic import.

Wolff ²⁰_{Apr. 3} has instituted a series of careful experiments on the inheritance of infectious diseases. Each disease must be studied independently. So far as his present observations go, he concludes that the placenta forms an insuperable barrier to the passage of anthrax bacilli from mother to foetus, and the vaccine virus in a similar manner is shut out from the foetus by the placenta. While clinical observations show that variola may be communicated from mother to foetus, yet this is rather by reason of haemorrhages in the genitalia causing direct infection from the maternal blood, and not by transmission through the placenta.

Buchner ⁵⁷_{Aug. 12} caused animals to inhale fine sprays containing spores and bacilli of anthrax, chicken-cholera, rabbit-septicæmia, hog-erysipelas, and glanders. Ninety-six out of one hundred and forty animals acquired the respective diseases in from two to four days. The microbes of anthrax, rabbit-septicæmia, hog-erysipelas, and chicken-cholera entered the blood directly through the alveolar walls and pulmonary capillaries, not through bronchial glands and lymph channels. Spores of anthrax reached the blood more readily than bacilli, as the latter, being more irritating, quickly set up a general inflammation of lung-tissues. Serofibrinous haemorrhagic pneumonia is the result, the alveoli being filled with exudate, in which masses of the rods and threads are imbedded. The local affection is severe, but general infection remarkably lessened. The bacilli of tubercle and of glanders, however, are not blood-

parasites, and set up local disease only, followed by infection of other viscera.

Queirolo ¹⁴_{Aug. 22} injected the sweat of patients affected with various infectious fevers into animals, which died in from twelve to eighteen hours, but without elevation of temperature, nor at the autopsies were the ordinary signs of infection discovered. He concludes that the sweat contains toxic matters, and that diaphoresis should be favored in treatment by all means possible.

Wiley ⁶_{June 10} considers that the cause of death in malignant fevers is paralysis, more or less sudden, of the vasomotor system, producing collapse of blood pressure throughout the body, and thus giving rise first to syncope, then to death from asphyxia, the same phenomena as result from experimental division of the splanchnics.

Monot ¹¹⁸⁸ finds an increase of leucocytes in all acute and chronic febrile affections, the number varying not only proportionately to the temperature but parallel with its course. He looks upon fever as a condition of leucocytosis, heat directly stimulating the activity of their reproduction.

Stöcker ⁷⁴⁰_{V.15, p. 318; Feb. 15} ⁵⁴ has investigated the changes produced in the marrow of bones by acute febrile diseases in animals. He finds arterial and venous hyperæmia, haemorrhagic infarction, metaplasia (*i. e.*, change of yellow into red or lymphoid marrow), and hyperplasia. These changes are due in part to chemical action, in part to the mechanical effect of organized or unorganized foreign bodies in the blood-stream. In addition to this, in several instances, similar affections of the synovial membrane of neighboring joints was found. Nine cases are related, including pleuropneumonia, colic, septicæmia, tetanus, and lumbago gravis.

Tumas ³²⁶_{BD. 41, N. 4, 5} has examined the blood in twenty cases of typhoid fever, one of spotted typhus, and nine of croupous pneumonia. Under the influence of septic fever the number of red corpuscles and the proportion of haemoglobin suffer absolute diminution. It is true that in the beginning of typhoid fever, for example, there is an apparent increase of the red globules as well as of haemoglobin; but this is relative only, the blood being deficient in water. In croupous pneumonia of fevers of short duration, the diminution of red globules is less prolonged than in typhoid. In the latter, too, the haemoglobin curve is lower than that of the blood-cells,

showing that the proportion of haemoglobin is relatively diminished to the number of red globules. This is explained by the longer duration of the malady as compared, for example, with croupous pneumonia. Tumas believes that he has proved the error of Böckmann's theory, that the proportion of red cells varies inversely, and that of white cells directly, as the intensity of the fever. On the contrary, fever determines in general an absolute as well as a relative decrease of white cells, while during the non-febrile period the number is normal or slightly augmented. In pneumonia, however, the conditions are reversed. The author offers no explanation of the fact.

McLaughlin,²² considers hyperpyrexia dependent on deficient correlations between production and loss of heat due to derangement of the nervous system by impressions from without, by the condition of the blood, or by disease of its own substance. Typhoid symptoms are referred to accumulation of waste products in the blood. He relates the case of a child of four years, in whom fever, with a temperature of 106° F. (41.11° C.), was clearly attributable to fright; also that of a strong, healthy man, aged fifty, who, after a fall injuring ribs, right lung, and possibly liver, progressed favorably for a week, and then suddenly, without chill, developed a temperature of one hundred and seven degrees. McLaughlin excludes inflammation of lungs or liver, contraction of cutaneous blood-vessels, or disease of spinal cord, and concludes that as there were no head symptoms previous to the rise of temperature, the cause of the mischief was located somewhere in the nerves of chest or abdomen, probably in sympathetic ganglia near the heads of the ribs injured at the time of the accident.

Gamaleia²⁶² ³⁴ _{No. 3 Aug. 25} considers that in splenic fever and pneumonia, it has been demonstrated that neither the infectious micro-organisms nor their ptomaines can be looked upon as a cause of fever. After injection of virulent anthrax bacteria, causing speedy death, fever may be altogether absent, in which case, too, there will be no splenic tumor. On the contrary, injection of attenuated bacteria causes, as a rule, fever of several days' duration, with marked hyperæmia and enlargement of the spleen. Further, according to Hoffa, the isolated alkaloid of anthrax bacteria in non-lethal doses does not cause fever, but only somnolence and coma, associated with minimal elevation of temperature. If, then, fever is not a direct

effect of bacteria or of their products, it must be a reaction of the organism against their invasion. The hyperæmia of kidneys, liver, bone-marrow, and spleen in animals dying with fever after inoculation with anthrax is considered a proof of this position. Microscopic examination shows that during the fever an active warfare is conducted against the bacteria, which show, especially in the spleen and bone-marrow, numerous evidences of degenerative change, most marked in the interior of the so-called makrophagi of Metchnikoff, cells of the spleen-pulp which exhibit large round nuclei. The author found the same condition after injection of various pathogenic and non-pathogenic bacteria, which, during the fastigium of fever, were found inclosed in the makrophagi, either still living or already deprived of activity. He concludes that the pathological manifestation of fever in infectious diseases must be considered as the sum total of the alterations in the activity of circulatory and glandular systems by which the destruction and expulsion of bacteria are accomplished. From this point of view the administration of antipyretics, which do not combat the bacteria, but the fever that should destroy them, must appear to be of doubtful wisdom.

Bornemann⁵⁰⁵_{506; 507; 508} relates an instance of peculiar disturbance of temperature during convalescence from scarlatina in a child aged eight years. The morning temperature was normal or subnormal (36.2° C., 96.8° F.), while the evening temperature would reach 38.5° to 39.4° C. (101° to 103° F.). Antifebrin produced a suspension of the disturbance, which reappeared on the withdrawal of the drug. Recovery finally took place under the influence of this medicament. The author believes the symptoms to have been caused by an affection of the heat-regulating centres analogous to that which occurs in muscles after typhoid fever and in the nerves after diphtheria.

De Ruyter⁵⁰⁹_{Apr. 19} found on spectroscopic examination of the blood of living animals infected with anthrax, glanders, and tuberculosis no alteration. Blood infected with the virus of malignant œdema and allowed to decompose showed a spectrum line having certain points of coincidence with that of metahaemoglobin. This line could also be demonstrated in many forms of sepsis, on reducing the blood with ammonium sulphide. Other observations on the blood of human beings suffering with septic diphtheria gave similar results.

Further investigations will be undertaken to determine whether this indicates an alteration of oxyhaemoglobin by the action of ptomaines.

Ott,⁵⁹ in a paper before the American Physiological Society, related observations upon eight animals in whom putrid blood was injected subcutaneously and by the jugular vein. Five showed increased production of heat, three diminished heat production. Heat dissipation was increased in four and diminished in four. He attributes fever to derangement of the harmony of thermogenesis, thermolysis, and thermotaxis, by an agent developed within or entering from without. Its result is increased metabolism. The four basal centres play the most important part in the production of fever.

GENERAL CONSIDERATIONS ON THE TREATMENT OF FEVER.

Liebermeister⁶⁰ discusses the treatment of fever under the following general propositions: (1) in many cases of febrile disease the height of the temperature constitutes a danger; (2) in such cases the therapeutic problem is to reduce the temperature; (3) the basis of the antipyretic treatment is the direct withdrawal of heat by means of cooling baths; (4) in many cases the administration of antipyretic medicaments is at the same time necessary. He concludes his paper with the expression of the hope that he will live to see the time when, as a result of experience, the profession will become very generally adherents of the antipyretic treatment.

Arkle²² reports a case of hyperpyrexia and rheumatism in a man, aged twenty-seven, in whom the temperature reached 110.4° F. (43.6° C.), successfully treated by cold. After forty minutes in an ice-cold bath, the temperature fell to 97° F. (36.11° C.), but ran up four hours later to 107.2° F. (42° C.), notwithstanding the administration of antifebrin. The bath was repeated for twenty-five minutes, the temperature fell again, and showed no further tendency to run up excessively. No visceral lesion. Patient discharged cured. The author reports a second case, that of a woman, likewise suffering from rheumatism, in whom the temperature suddenly ran up to 110.4° F. (43.33° C.). This rise was associated with violent delirium. Patient was treated with ice-cold packs. Temperature fell in an hour to 101° F. (38.33° C.). Likewise discharged cured.

Carslaw ²¹³ _{Apr.} concludes from a series of clinical studies that though phenacetin has antipyretic properties, it is uncertain in its effects and by no means free from danger; and further, that, comparing it with other antipyretic remedies, such as quinine, sodium salicylate, antipyrin, and antifebrin, already familiar in hospital-practice, it is not at all entitled to the prominent position which has been assigned to it.

Grenfell ¹⁵ _{v.1, p. 244} reports a series of cases, with temperature-charts, in which phenacetin was employed as an antipyretic. He demonstrated that its action in this direction is positive. The temperature begins to fall within half an hour after the administration. The patient generally perspires freely and feels drowsy. Sleep often follows and pain is relieved, while the patient always says that he feels more comfortable after the administration of the medicine. The most satisfactory dose for an adult is about 8 grains (0.52 gramme). Children bear the drug well.

Vernon ⁸⁰ _{June 15} holds the opinion that in the treatment of serious febrile affections, as well as for the prevention or jugulation of pyrexia, slight purgation plays a most important rôle. Without the important co-operation of this form of treatment, antisepsis and antipyrexia could have no existence.

Barnett ⁶¹ _{Sept. 29} regards ammonium salicylate as among the more efficient of the antipyretics. In all fevers characterized by extreme adynamia it may be safely used, owing to its ammonium base. It is stimulant as well as antipyretic, and thus fulfills indications only met by a combination of remedies. It is an agent of wide germicidal powers, being promptly efficient in affections differing widely in their etiology and pathology. As a remedial agent in typhoid and remittent fevers it is unsurpassed, aborting them at the outset under favorable conditions, and gradually mitigating their severity and danger under circumstances less favorable. The author's opinions have been corroborated by Sullivan, Fliesburg, Wick, Sauerherring, and others. Further investigations are needed.

Year by year the evidence increases that the febrile process is dependent upon the presence in the body-fluids of certain irritants or noxæ of uncertain nature, and affecting primarily cellular function and nutrition. The pyrexia must be attributed to a derangement of the activity of an hypothetic heat-regulating mechanism,

in consequence of which heat-dissipation does not keep pace with heat-generation. The undue elevation of temperature in turn intensifies the functional and nutritional disturbance resulting from the primal cause. The therapeutic indications derived from this line of reasoning leads to the employment of rational measures calculated to aid in the suppression or elimination of the noxious irritant, in the restoration and maintenance of the nutritive balance, and in the reduction of injurious pyrexia. Until we know more of the causation of fever we cannot hope for the discovery of a specific remedy. No single measure, however, of which we have knowledge, so nearly fulfills the symptomatic indications as the intelligent employment of the cold bath. Other measures must at the same time not be neglected.

GENERAL CONSIDERATIONS.

(From the ANNUAL for 1890.)

GENERAL PATHOLOGY OF FEVER.

The interest in this field of pathology and clinical medicine is unabated. We note from year to year not only a larger place in current literature, but greater definiteness of statement and accuracy of description in the communications. Enteric fever, the great fever of the present historical epoch, receives peculiar attention and occupies the larger part of the space. Valuable papers upon the prophylaxis of this disease have appeared during the past year. Whilst it cannot be said that there is much that is really new in regard to treatment, the activity shown in the study and comparison of different forms of treatment is yielding good results. The hope may be entertained that the methods that are really hurtful will gradually fall out of use, and that the time is not far distant when the profession at large will be able to agree upon the relative value of the expectant, the expectant-symptomatic, the antiseptic, and the antipyretic plans. The other fevers receive due attention. The question as to whether or not the collection of symptoms known as Weil's disease constitutes a pathological entity seems in a fair way of early settlement. The unusually large number of papers relating to irregular febrile diseases hitherto undescribed, which appeared toward the end of the year, is probably in some part due to the fact that the true nature of the earlier cases of epidemic influenza was not in all instances recognized.

Ott's experiments, briefly referred to in the ANNUAL of last year, have appeared in full.²⁴² They were made upon rabbits and cats, and putrid blood was the pyrogenic material selected. The animals were deprived of food twelve hours before the observations

were started. As a rule, the experimental fever was accompanied by increased heat production. Exceptionally, production was decreased. Both heat production and heat dissipation may be below normal and yet increased temperature be manifested. High temperature is an indication of danger in specific fever not the cause of it. Temperature is only a part of a specific fever. There are many other morbid processes going on, the essence of which has not been grasped. Subnormal temperature in typhoid patients, for example, is due, like elevation of temperature, to disorder of thermotaxic centres.

Dochmann⁸⁴ believes that the rise of body-temperature in infectious diseases is a manifestation of the *vis medicatrix naturæ*. When cats that had been poisoned with curare were placed in the heating apparatus and subjected to an artificial elevation of temperature, they quickly recovered from the intoxication, which was not the case with other animals used for control experiments. Similar results were obtained in animals injected with putrid substances.

Roussy¹⁰⁰ has made some experimental and clinical researches upon the pathogenesis of fever and upon certain calorogenic and frigogenic substances of microbian origin, which he has named "pyretogenine" and "frigogenine." His investigations have extended over more than three years and embrace more than 400 varied experiments. The following conclusions may be cited: Subcutaneous and intra-venous injections of stale beer, of macerations of hay, of tainted meat, etc., always determine fever in dogs and rabbits. The intensity and rapidity which characterizes the fever indicate that it is due more to soluble chemical substances than to the mechanical actions of micro-organisms contained in the injected liquids. Intra-stomachal injections produced but little fever in rabbits, and are without effect upon dogs, indicating that the soluble chemical substances are modified or destroyed in the intestines, or in the organs they must traverse to enter the system, and possibly, in dogs, may not be absorbed at all. Concerning pyrogenine, the most active of the fever-producing agents experimented with, which is extracted from solutions containing spores of the yeast-plant, the author considers that it is not alone a base exclusively organic, but that it is itself a diastase of considerable energy. An infinitesimal quantity will rapidly convert a relatively

enormous quantity of starchy material into sugar. Roussy is inclined to make a generalization that all cellules—that is, all micro-organisms, or, in one word, all the biological units—elaborate diastases, or soluble ferments, which serve to attack and transform all organic materials with which they are brought in contact. He would thus explain the probable origin and course of infectious diseases, especially of fevers.

Hanau¹⁵ _{Dec. 28} contributes a thoughtful and suggestive paper on "The Theory of Recovery and Immunity from Infective Diseases." He opposes the doctrine of phagocytes, and denies the similarity of immunity and recovery. In this connection he cites the phenomena of recurrent erysipelas, the malarial cachexia, relapsing fever, gonorrhœa, and syphilis. In the latter, so far from recovery and immunity being allied processes, renewed vulnerability is considered the best evidence of recovery. The different phases of disease, including recovery, he looks upon as intimately related with different periods in the development of the specific microbe. Recovery may take place independently of the death of the invading organism in two ways: First, it may be due to the transformation of the parasite into an innocuous form, as in the case of encapsulated trichinae. The death of the host is simply an intercurrent accident preventing the full development of the pathogenic organism. Second, the pathogenic organism may be expelled from the body, as in the recognized cases of spontaneous evacuation of an abscess. Another method of elimination is the gradual epithelial exfoliation which occurs in catarrhal inflammations. The whole phenomena of disease, recovery, and immunity are due to action and reaction between the parasite and the tissues of the host. On each side it may lead to certain morphological or biological transformations.

PREVENTION OF FEVERS.

Welch,⁵⁹ _{July 27} in his address on State medicine before the American Medical Association, considers some external sources of infection in their bearing upon preventive medicine. Many infectious agents are transported by the air, but the extent of danger from this source has often been exaggerated. A fact of capital importance in understanding the relation of bacteria to the air is the impossibility of currents of air detaching bacteria from moist surfaces.

Substances containing pathogenic bacteria, as, for instance, sputa containing tubercle bacilli or excreta holding typhoid bacilli, cannot affect the air unless these substances first become dry and are converted into a fine powder.

The only pathogenic bacteria which have heretofore been found in the air are the pus-organisms, including the streptococcus found by Prudden in a series of cases of diphtheria and tubercle bacilli; but the evidence in other ways is conclusive that many infectious agents—and here the malarial germ should be prominently mentioned—can be, and often are, conveyed by the air. Such germs may be deposited on substances with which we readily come into contact, or they may fall on articles of food, where they may find conditions suitable for their reproduction. The practical conclusions are: the necessity of guarding, so far as practicable, against the desiccation, when exposed to the air, of substances which contain infectious germs not destroyed by drying, and the equal necessity of free ventilation.

Welch protests against placing reliance upon any method heretofore employed for disinfecting houses or apartments by fumigation, and calls attention to the lack in most cities in this country of public disinfecting establishments such as are in use in most cities in Europe, and which are indispensable for the thorough and convenient disinfection of clothing, bedding, carpets, etc.

That the prevalence of many infectious diseases depends upon conditions appertaining to the soil he believes cannot be questioned. The ground, unlike the air, is the resting or the breeding place of a vast number of species of micro-organisms, including some which are pathogenic. Among the pathogenic bacteria which have their natural home in the soil, the most widely distributed are the bacilli of malignant œdema and those of tetanus. He found some garden-earth in Baltimore extremely rich in tetanus bacilli. In infected localities the anthrax bacillus and, in two instances, the typhoid bacillus, so far as it was possible to identify it, have been discovered in the earth.

Investigators are as yet unable, by the conclusions which may be drawn from observations of various authorities cited by Welch, to agree as to the earth being a good breeding place for most of the infectious bacteria with which we are acquainted. They seem to lean to the belief that it is not favorable to the propagation of

bacteria, but that it can contain for a long time, with unimpaired vitality, those which produce spores, or which offer considerable resistance to injurious agencies, such as anthrax bacilli, tubercle bacilli, and the pyogenic cocci. We may be brought into contact with infectious bacilli in the ground, either directly or by means of vegetables to which particles of earth are attached, by the infection of domestic animals, by the medium of flies or other insects, and by a variety of other ways more or less different. An important medium of transportation of bacteria from infected soil is drinking-water, or water used for domestic purposes. It is important to keep infectious substances as far as possible from the ground. This implies the early disinfection or destruction of such substances as typhoid and cholera excreta and tuberculous sputum.

The ground should be rendered, as far as practicable, unsuitable for the continued existence of infectious germs. This, at least, for some diseases, is accomplished by a proper system of drainage. Means should be provided to prevent waste products from getting into the ground around human habitations or from gaining access to water used for drinking or domestic purposes. In cities this can be accomplished only by a properly-constructed system of sewers. Finally, Welch states that in cities good pavements, absence of unnecessary disturbance of the soil, cleanliness of the streets, and laying of dust by sprinkling are not only conducive to comfort, but are sometimes hygienically important in preventing infection from the ground and dust.

Ordinary water contains bacteria in large numbers; not a few species can multiply rapidly even in distilled water. These are usually harmless saprophytes. Water is not a favorable breeding place for pathogenic bacteria, but it is not necessary that pathogenic bacteria should actually multiply in a medium to render it infectious; it is sufficient if their life and virulence are not destroyed in a very short time. In unsterilized water, kept at 105° C. (221° F.), the typhoid bacilli are demonstrable for seven days and the cholera bacteria for two days. In view of the fact that typhoid or cholera infection is not so often the result of throwing the stools of typhoid or cholera directly into the source of water-supply as it is the consequence of leaky drains, cess-pools, or infected soil, there is no sufficient reason, from a bacteriological point of view, for rejecting the transmissibility of typhoid fever and

cholera by the medium of drinking-water. Pathogenic bacteria may preserve their vitality longer in ice than in unsterilized drinking-water. Thus, Prudden found typhoid bacilli still alive which had been contained in ice for 103 days. The subsoil water, under ordinary circumstances, is germ-free; the surface water is exposed to all manner of infection from the ground, the air, and the direct admission of waste substances. Unfortunately, in the ordinary way of obtaining subsoil water for drinking purposes, by means of dug-wells, this distinction is obliterated, for the water which enters these wells free from bacteria is converted into a surface water often exposed, by the situation of the well, to more dangerous contamination than any other surface waters used for drinking purposes. We have, at present, no domestic filters which are satisfactory, and most of those in common use are worse than none, as they soon furnish a filtrate richer in bacteria than the original water. The only effective way of water filtration for the general supply is by means of large sand-filters, such as are in use with excellent results in Berlin and some other European cities. Neither chemical or bacteriological investigations can be relied upon exclusively, and both may prove ineffectual to demonstrate the infectiousness or non-infectiousness of a suspected source of water-supply. Many articles of food offer an excellent nutritive medium for the growth of a number of species of pathogenic micro-organisms. Fortunately, a large part of our food is sterilized in the process of cooking shortly before it is eaten, so that the danger of infection from this source is greatly diminished. Milk, in consequence of its extensive employment in an unsterilized state and of the excellent nutritive conditions which it presents to many pathogenic bacteria, should be emphasized as especially liable to carry certain kinds of infection. Not only the presence of infectious bacteria, but also that of bacteria capable of multiplication within the body, may give rise in milk and other kinds of food to various ptomaines, products of fermentation, and other injurious substances which, when ingested, are likely to cause more or less severe intoxication, or to render the alimentary tract more susceptible to the invasion and multiplication of genuinely infectious organisms.

Foote⁵ has experimented on the sterilization of faeces. His conclusions are that the best disinfectants to use are the bichloride of mercury with hydrochloric acid, the bichloride of mercury with

potassium permanganate, and the chloride of lime. Five-per-cent. solution of carbolic acid and $\frac{1}{10}$ -per-cent. solutions of the bichloride are unreliable, even when used in the proportion of 1 pint ($\frac{1}{2}$ litre) to every 100 cubic centimetres (3.38 fluidounces) of dejection.

Emphasis needs to be laid on the necessity of thorough disintegration of the faecal matter by stirring with the disinfectant, and on the necessity of allowing the mixture to stand four hours, at least, before emptying. For continued use the bichloride solutions would injure lead pipe, while if used for a few days only probably no injury would result. For long-continued use, where the dejections are thrown into a water-closet, chloride of lime is the most available disinfectant. Solutions of chloride of lime should be kept tightly corked, and should not be used after they are one week old.

Sehrwald⁴,_{June 5} made some bacteriological experiments in Rossbach's laboratory, from which he draws the following conclusions: 1. Naphthalin retards but slowly, in the temperature of a room, the development of the bacilli of putrefaction of faeces and of typhoid. 2. Naphthalin, finely powdered and well spread, or in solution and continually shaken, has its disinfecting power increased. 3. In a temperature of 98° F. (36.66° C.) the effect of naphthalin is much more powerful, which makes it highly probable that it is chiefly in its gaseous state that it destroys the germs. 4. Gaseous naphthalin, in solution, has more effect on aërobic than on anaërobic bacilli, and more on germs cultivated in a solid medium than on those cultivated in liquid. 5. The conditions for the full effect of naphthalin are much more favorable in the intestines than in the test-glass. 6. Naphthalin added to faeces decreases their germs by about a half, but, administered internally, it first decreases them to one-third or even to a quarter; after this, however, their number rises again almost to its original figure. 7. Against the bacilli of typhoid stools naphthalin is considered still more effective, and decreases the number of germs even to one-tenth. 8. The administration of naphthalin should be commenced at the very beginning of typhoid fever. 9. As calomel affects some of the faecal bacilli, while others are more readily destroyed by naphthalin, it is best to give, whenever possible, both drugs combined.

Charrin and Ruffer³,_{Mar. 19} conducted a series of experiments to determine the influence of the nervous system in resisting infection. In animals in which they cut the sciatic nerve they found a

greater tendency to localized infection than where the nerve was left intact, and death occurred more readily. They had made but one experiment with the pneumogastric, but so far as this went it confirmed the others.

GENERAL TREATMENT.

Spraying to Reduce Temperature.—Placzek²⁰ has made experimental observations upon animals and clinical studies upon fever patients with the method of reducing temperature by cold-water spraying advocated by Preyer and Flasher in 1884, and later employed by Hiller in the treatment of sun-stroke. He uses first a spray of cool water, about 1½ pints (75 centimetres), and later 3 or 4 ounces (93 or 125 grammes) or more of warm water. In animals he succeeded in reducing temperature 2 degrees by this procedure, and in a phthisical patient, with a temperature of 104° F. (40° C.), reduced and for four hours kept it at normal. In place of the large quantity of water used in bathing, this requires only 1 litre (1 quart) three-fourths of a temperature between 15° to 18° C. (59° to 66° F.) and one-fourth of 40° C. (104° F.). The procedure lasts about twenty-five minutes, and can be repeated frequently.

Antipyretic Medication.—Joseph Jones, of New Orleans, La., collaborator,¹¹⁴ considers that antipyrin, acetanilid, phenacetin, salol, and saccharin are destined to occupy a permanent position in therapeutics. An extreme degree of fever, with or without complications, is dangerous and must be controlled. In addition to the direct subtraction of heat by cold applications, we may, with due caution, have recourse to antipyretic remedies. Quinine is often to be preferred because of its undoubted action on some infective principles and its more lasting effects. A distinction must be drawn between fever and its pathogenic agent, for an antipyretic such as antipyrin or antifebrin may not act on this agent, and so may have an independent and therefore transitory action; or it may influence this agent, as quinine appears to do in some diseases.

Huet³⁴ does not think that antipyretic measures are always necessary in the treatment of fevers, and believes, moreover, that the new agents, whose action is principally symptomatic, are not only inutile but often dangerous. Pel, of Amsterdam, Holland, corresponding editor, would not employ any antipyretic medicaments except those which at the same time exerted a specific influence upon the cause of the disease; for example, quinine in

malarial fever or salicylic acid in rheumatism. It is quite probable that fevers in many instances are a salutary reaction. When directly combated, especially by the new antipyretic remedies, alarming phenomena of collapse may ensue. In his criticism of antipyretic measures, however, he does not include cold baths. These may be regarded as stimulants to the nervous system. Rosenstein announces himself as a resolute partisan of antipyresis by means of cold water. He prefers, however, in the treatment of typhoid fever, cold sponging and bathing. Euphoria is favored by reduction of temperature in this manner.

Crombie¹⁵ has studied the comparative value of antipyrin, antifebrin, and phenacetin as antipyretics in the climate of India. He concludes that, as regards efficacy, antipyrin comes first, and that there is little to choose between antifebrin and phenacetin. As regards safety, the advantage lies with phenacetin. He has never known a subnormal temperature result from the use of that drug. As regards rapidity of action, antipyrin comes first, antifebrin second, phenacetin third. As regards duration of effect, the advantage lies with phenacetin. As regards certainty of action, he would quote them in the same order as rapidity, antipyrin, antifebrin, phenacetin. Phenacetin tablets are so hard as to be practically insoluble in the stomach. It should therefore be prescribed in lozenges, which are soft and friable. As regards inconvenience, in the climate of India phenacetin is followed by just as profuse sweating as either antipyrin or antifebrin. The use of these drugs does not in any way shorten an attack of fever. Enteric fever, simple continued fever, and remittent fever pursue their course unaffected; but there are a certain number of cases which have been brought to a sudden termination by the use of these drugs, namely, those in which there is a sudden attack of high fever after a chill or exposure to the sun. Crombie believes that temperature should always be kept below 103° F. (39.46° C.). This can be accomplished most safely by means of cold packing, but there are practical difficulties in carrying out such a practice which lead him to the use of antipyretics. On the whole, he believes, the choice lies between antifebrin and phenacetin, as antipyrin is liable to produce collapse. Phenacetin is probably the best, as it possesses a soothing and soporific effect not shared by the other antipyretics.

Penzoldt³⁴ _{Aug. 50} considers the effect of the antipyretics upon the haemoglobin. He has not discovered any dangerous influence.

Hyperpyrexia in an Infant Treated with Cold Baths.—Adie²⁰⁸ _{Jan.} reports the case of a female infant, aged 18 days, admitted into the Eden Hospital with a rectal temperature of 110° F. (43.3° C.). The mother had had a rise of temperature on the evening of the day she was delivered, and the child's fever was first noticed at the same time. The baby's skin was hot and red generally, the face a trifle pale, the finger-tips and lips normal; the hands and fingers were contracted, but there was no twitching; the mouth was tightly closed; there was no opisthotonus. The heart-beats varied in rate from 130 to 180; sometimes they could not be counted. Respirations were rapid, but not labored. No pulmonary lesion was detected. The abdomen was distended and somewhat tympanitic; liver and spleen were not felt to be enlarged. Treatment consisted in keeping the heart going with stimulants and reducing the temperature with the graduated bath. In the first fifteen minutes after being placed in a bath at 89° F. (31.66° C.) the temperature fell to 108.8° F. (42.6° C.). In fifteen minutes more, the water being at 86° F. (30° C.), the temperature had fallen to 100.6° F. (38.11° C.). It was intended to take the patient out when the temperature had fallen to 100° F. (37.77° C.). In three minutes, however, it suddenly fell from 100.6° to 97° F. (38.11° to 36.11° C.). The child was instantly taken out and dried. Friction over the whole body with compound camphor-liniment was instantly begun by four nurses. The temperature continued to fall, and reached 95.4° F. (35.22° C.), a fall of 14.6° F. (8.1° C.) in forty-five minutes. Heat was applied externally, brandy and milk were administered internally, and in the course of about an hour the temperature rose to 100.6° F. (38.11° C.). It continued rising, and reached 103.6° F. (39.77° C.), when the graduated bath was again employed, and the temperature reduced to 99° F. (37.22° C.). It did not again rise above 100.2° F. (37.9° C.), varying usually between 98° and 100° F. (36.66° and 37.77° C.), and in six days the patient was discharged cured. No pulmonary symptoms developed at any time. The cause of the hyperpyrexia is supposed to have been a fading tetanus.

The opinion is crystallizing that many febrile processes are dependent upon the action of irritants generated as a result either of

the vital activity of micro-organisms or of the reaction of the body-cells to the invasion of these organisms. It is also admitted that the chemical products of abnormal catabolic activity may bring about a similar result. In illustration of the practical outcome of these conceptions we need but point to the constantly increasing precautions observed to prevent the spread of communicable diseases and the measures pursued to avoid the evil results of auto-intoxication in its various forms.

GENERAL CONSIDERATIONS.

(From the ANNUAL for 1891.)

Cantani ²⁰ has presented an able paper on the subject of antipyresis. The local production of heat, the result of processes of chemical combustion, forms an essential factor. The action of nerve-centres may produce a temporary rise of temperature, but not a continuous or remittent elevation. Fever must be looked upon as an acute alteration of organic metabolism, with increase of tissue-combustion, and, consequently, also, of heat and consumption of body.

In some fevers more heat may be retained, but increased production of heat, increased consumption of oxygen, and heightened combustion are the chief factors in the production of fever. Clinically, all fevers do not consume the combustible material of the body in the same manner and to the same degree, varying, probably, according to the different infecting agents. Thus, in malarial fevers, and in acute articular rheumatism, many red blood-corpuscles are destroyed,—hence the anaemic appearance of persons recovering from these affections. In typhoid fever, the muscular tissue and, to a less degree, the nervous system suffer, explaining the great debility and emaciation which follow these diseases and the continued loss of weight during the first days of convalescence. In tuberculosis, all tissues and organs suffer; the whole body wastes; even the heart becomes smaller and the vessels narrower; only the nervous system remains intact; the patient often preserves his whole nervous energy and goes about up to the last days of his life.

Fever can be reduced in one of two ways. Excessive consumption can be diminished either by the withdrawal of heat or by a diminution in the production of heat. Withdrawal of heat does not combat the fever itself. To diminish the production of heat, various remedies have been used,—quinine, digitalis, salicylic acid, carbolic acid, kairin, thallin, antipyrin, phenacetin, and others.

Fever is a general reaction of the organism to changes in metabolism and in the blood, produced by the causative agent of the disease. This reaction is necessary to bring about cure. The

temperature alone is not a measure of the gravity of the disease. A moderate degree of fever may be due to a want of reactive power on the part of the organism, a high degree to the energy with which the organism defends itself against the invasion of the disease. The fever itself, therefore, has a favorable effect and may be of use in various ways: by diminishing the vitality or virulence of the living causes of disease and by raising the temperature of the tissues and of the blood; by increasing the power of resistance of the tissue elements in their phagocytic activity; by altering the nutritive soil in the tissues and rendering it less favorable for the growth and development of the germ of disease: in fact, by sterilizing the body. Fever, therefore, may be useful as long as the consumption of tissue does not give rise to exhaustion. The proper remedies for fever would be such as act on the cause of the disease. In this way quinine acts in malaria, mercury in syphilis. The antipyretic remedies, as antipyrin, have no special action on the cause of fever. They lower temperature by increasing radiation of heat from the body, and diminish heat production. They do harm by interrupting the course of the fever, diminishing the means of defense of the human organism, for a diminution in the production of heat is equivalent to a diminution of the vitality of the human organism and of the power of resistance.

High temperature, however, is not always useful in disease. The cardiac muscle may suffer or the nervous system be threatened. Under these circumstances, a reduction of temperature is desirable, if, by abstraction of heat, heat production is not diminished. The various hydriatic measures, such as cold baths, the cold pack, cold douches, the administration of large quantities of cold water, either by the mouth or by enema, act in this way. They absorb a large amount of heat from the body, whilst they rather augment the formation of heat. It is not known if the good effects which these remedies produce are due to increased tissue waste and elimination of excrementitious matters, including ptomaines and leucomaines. Certain diseases, attended with high temperature, are often successfully treated with diaphoretics, which cause an increased excretion of noxious matters, but which scarcely, if at all, increase heat production.

The conclusion reached by Cantani is that fever is an essential and, to a certain degree, a beneficial reaction to acute disease.

For certain fevers there are specific remedies, which attack the cause of the disease itself. There are, however, no general antipyretics. The most that can be done is to diminish the accumulation of heat in the febrile body without lowering the production of heat. To effect this, the hydriatic remedies can be recommended, whilst the chemical antipyretics must be looked upon with suspicion as general remedies for fever.

Armand, Gautier, Hayem and Schutzenberger,¹⁰ Nov. 12, '10 a commission appointed by the Académie de Médecine to investigate the results announced by Roussy on the pathogenesis of fever, referred to in the ANNUAL of last year, have repeated the principal experiments of that investigator, and find them precisely as described. Roussy⁴⁰ has made a further communication on the subject, in which he delineates the following line of investigation: After detailing the preliminary experiments, suggesting that the pyretogenic properties possessed by putrid fluids are due to soluble chemical substances, he successfully demonstrates by experiments that infusions of the living yeast-plant possess pyretogenic properties as energetic as those of putrid fluids; that the mechanical action of microbes alone is incapable of producing fever; that the cellules of the yeast-plant secrete the chemical pyretogenic substances. Finally, an extract of the specific pyretogenic substance contained in infusions of the yeast-plant was obtained, to which the name of pyretogenin was given, and of which the physical, chemical, and physiological properties were studied. Pyretogenin is described as a special basic molecule, organic, highly nitrogenized, and a diastase of great energy.

Wood and Marshall,² Aug. 10 in a paper on the "Relation Between Fever and Urea Production," read at the Tenth International Medical Congress, at Berlin, deny that it is proved that increased elimination of urea is an integral part of the febrile process. Such increase might be accidental or secondary,—a result, perhaps, of high temperature. Bodily temperature and increased production of urea do not keep pace with one another. At critical periods in fevers the temperature may be low, but the elimination of urea increased. This indicates that the relation is between heat dissipation and heat production. Frequently, at critical periods, low temperature co-exists with an enormous increase of heat production. In hepatic fever it was found that the excretion

of urea was greater on the days on which there was fever than during the intermissions. In 2 cases of intense fever following section of the medulla, in which heat production was universally augmented, the elimination of urea was almost arrested.

Charrin and Roger¹⁰⁸ made a series of investigations to determine the influence of fatigue in the production of infectious disease. A number of white rats were subjected to excessive exercise (running in a rotating cage) for seven hours of each of four consecutive days. Eight of these animals and four others were then inoculated with attenuated anthrax virus. Seven of the eight succumbed, while all of the four control animals survived. Perhaps in this way may be explained the epidemics which break out among soldiers engaged in actual service.

Botkin,⁵⁸ as a result of three hundred observations upon 7 cases of typhoid fever, 2 of typhus, 1 of malaria, and 2 of croupous pneumonia, found that variations in the constitution of the gastric juice were not dependent upon the nature of the disease. The most marked change was the diminution of the general acidity, with especial diminution of free hydrochloric acid, which in most cases was entirely wanting. Elevation of temperature is associated with diminution of hydrochloric acid, with but few exceptions. Neither is there any relation between the chemical constitution of the gastric juice and the appearance of the tongue, on the one hand, and the appetite during convalescence and deranged activity of the bowel upon the other.

In acute febrile diseases, the variations in the constitution of the gastric juice depend upon the severity of the attack and the resistance of the individual. After being absent during the stage of fever, hydrochloric acid appears suddenly in large amount, to diminish again in a few days, finally becoming normal. Botkin considers this variation analogous to the critical sweats and increased elimination of urine at the close of acute febrile diseases. Lactic acid was always present, sometimes, however, only in traces. On account of deficiency of hydrochloric acid, the amount of albumen coagulable on heating was small. The reverse was the case with propeptone. When, however, fever was high and loss of strength marked, the amount both of propeptone and coagulable albumen was small. When hydrochloric acid was present, digestion of a slice of boiled egg was active; when the acid was absent, digestion

took place only on the addition of hydrochloric acid and pepsin. If pepsin alone were added to gastric juice which contained little hydrochloric acid, digestion was retarded. The changes which take place in the constitution of the gastric juice in the course of febrile affections may be thus summarized: the hydrochloric acid first disappears, then the rennet-curdling (lab) ferment; lastly, the amount of pepsin diminishes, but never entirely disappears.

As a result of observations made at the clinic of Kahler, at Vienna, upon the respiratory interchange of gases during fever, Kraus¹¹⁴ v. 18, No. 1, 2 has arrived at these conclusions: It is possible for fever to exist without apparent increase of processes of oxidation. Such a condition may be found in cases in which fever has existed for a long time with marked emaciation. In cases of infectious disease of short standing, the increased consumption of oxygen, making allowance for respiratory variations, does not exceed the normal more than 20 per cent. Qualitative alterations in febrile tissue change do not materially influence the respiratory co-efficient, which is dependent upon the bodily condition.

In a series of observations, Hammerschlag²⁷³ v. 21, No. 6 found free fibrin ferment in the blood, not only in 12 of 19 febrile patients, but also in 2 of 5 non-febrile cases. From this it would appear that the presence of free fibrin ferment is not necessarily provocative of fever.

Angel Money⁶ Dec. 7, '99 states that he frequently finds the spleen enlarged in children under 2 years of age, not marantic, rhachitic, or syphilitic, when catarrh of the bronchi or of the intestines exists. He considers the spleen an erectile organ, and believes "that temporary splenic tumefaction is in infants (under 2) about as useful in the differential diagnosis of disease as is a temperature of 101° F. (40° C.)."

Slight Continued Fever.—Pepper¹¹² Dec. 7, '99 refers to the occurrence of a slight continued fever in certain susceptible individuals, with failure of the general health, weakness, loss of flesh, and pallor, out of all proportion to the local conditions. In some there may be slight derangement of the digestive apparatus, while in others the signs may be significant of the beginning of the changes in the vessels and organs which, unrestrained, finally lead to the condition of arterio-capillary fibrosis. The treatment requires the abatement of the local condition, a judicious arrangement of the diet, with a

nice adjustment of rest and exercise. In the cases in which vascular changes are suspected, blisters over the heart and the course of the great vessels, with administration of salicylates and iodides, are recommended.

GENERAL TREATMENT OF FEVER.

Klemperer,⁴ at the Ninth Congress for Internal Medicine, discussed the relation between the treatment of fever and the alkalinity of the blood. A theoretical distinction is to be made between an antithermic action—an influence upon the temperature merely—and an antipyretic action—an influence upon the causes of the high temperature. The determination of the alkalinity of the blood is a certain index of the presence of toxic substances which cause elevation of temperature, and which are of acid reaction. The more abundant these substances, the greater the diminution of the normal alkalinity of the blood. Antipyrin and antifebrin lower temperature, but do not affect the alkalinity of the blood.

As a result of a series of forty-two thermometric and calorimetric observations upon dogs, Mosso²⁷³ V.26, No. 6, 6 rejects the existence of a special heat-centre, and believes that the body temperature may be raised either as a result or independently of nervous disturbance. Injuries of the cortex cerebri, of the corpora striata and lenticular nuclei, and of the thalamus opticus were followed by slight transitory elevation of temperature, explicable by other conditions. The administration of antipyrin in these cases exerted no perceptible influence upon the temperature. Abstraction of a large quantity of blood was followed by elevation of temperature, scarcely influenced by preceding administration of antipyrin. Elevation of temperature induced by intra-venous injection of cultures of the staphylococcus pyogenes aureus was temporarily reduced by the administration of antipyrin, but was not influenced by injury of the cerebral centres. Injections of cocaine produced elevation of temperature, unaffected by the administration of antipyrin.

Calorimetric observations demonstrated that the bodily temperature is not determined by the degree of heat radiation, but by the degree of heat production. The elevation of temperature following abstraction of blood and that following injection of cocaine are results of influences acting upon the nervous system, while the elevation of temperature following injections of the staphylococcus aureus are independent of any influence upon the

nervous system. In the one case, the fever is of central origin; in the other, of peripheral origin. Maragliano¹¹⁴ determined that antipyretics in general caused vascular dilatation, which continued in the case of fever as long as the influence continued.

Cantani³⁵⁷ recommends the ingestion of large quantities of cold water and the administration of ice-water enemata in certain febrile conditions. In typhus, better results are obtained from the first; in typhoid, from the second. From $\frac{1}{2}$ to $1\frac{1}{2}$ drachms of tannic acid and from $1\frac{1}{2}$ to $7\frac{1}{2}$ grains of crystallized carbolic acid, with or without from $\frac{1}{2}$ to $\frac{1}{4}$ drachm of quinine, may, with advantage, be added to each enema.

Richardson³⁸ records the case of a woman with symptoms of peritonitis and a temperature of 109° F. (42.77° C.), in which he withdrew 22 ounces of blood from a vein of the arm after antipyretic remedies had been freely administered without avail. The temperature fell to 101° F. (38.33° C.), and for a time the urgent symptoms were relieved. The improvement continued for about four hours, when, despite assiduous treatment, the temperature again rose to 109° F. (42.77° C.), and death soon followed. The clinical lesson to be derived from this observation is that, while the removal of blood has the effect of reducing the febrile heat, it does not control the process of zymosis on which the febrile condition itself depends.

Diakonoff¹⁰⁹ arrived at the conclusion that alcohol diminishes the assimilation of the nitrogenous constituents of the food in habituated as well as non-habituated persons, though the effect is more pronounced in the latter. It impairs the appetite, increases the daily quantity of faeces, and lowers the quality of the latter. It retards disintegration of proteids in the system. In cases in which the assimilation of proteids falls but slightly, it diminishes the metamorphosis of nitrogenous substances; when the assimilation falls considerably, the metabolism increases. It augments the daily excretion of urine, but lessens the cutaneous and pulmonary transpiration. It improves the subjective condition. Diminishing systemic disintegration of proteids, it is a powerful adjuvant in controlling febrile affections. As a good diuretic, it promotes the elimination of suboxidized products and prevents their accumulation. Any unpleasant influence of alcohol on the digestion is compensated for by various beneficial effects.

GENERAL CONSIDERATIONS.

(From the ANNUAL for 1892.)

Heat-production and Heat-dissipation in the Normal and Febrile States.—Carter²⁴² gives the results of experiments on rabbits, cats, and dogs, which seem to demonstrate the non-existence of any diurnal rhythm of heat-production and heat-dissipation, though a distinct rhythm of temperature was evident, the maximum occurring in the evening, the minimum in the morning. The maxima and minima of heat-production and of heat-dissipation are not synchronous with the maxima and minima of animal temperature. As the temperature-rhythm occurred in animals that had been starved, and as it has been observed in those who sleep by day and work at night, it is concluded that it must be due to nervous influences, and probably to the activity of thermotaxic centres.

Danger of High Temperature.—Maurel³ states that he has experimentally been able to demonstrate that a temperature of 44° or 45° C. (111.3° to 113° F.) would destroy leucocytes in a few minutes, that at a temperature of 43° or 44° C. (109.4° to 111.3° F.) leucocytes would not live an hour, and that at a temperature of 42° or 43° C. (107.6° to 109.4° F.) leucocytes would preserve their activity for three hours, while if the temperature were lowered their vitality would be preserved for twelve hours. As an animal cannot survive the destruction of its leucocytes and the axillary temperature is a degree or a degree and a half lower than the internal temperature of the body, the danger of an axillary temperature of over 41.5° C. (106.6° F.) is obvious. Should this temperature reach 42.5° or 43° C. (108.5° to 109.4° F.), it becomes fatal to the leucocytes and to the individual. This knowledge equally explains the advantage of a reduction of a degree or two in febrile temperature, the leucocytes thus being restored to activity instead of undergoing destruction.

Relation between High Temperature and the Degree of Alkalinity of the Blood.—The results of the experiments of Wittkowsky²⁷³ demonstrate that the elevation of temperature resulting from puncture of the brain is not associated with a reduction in the proportion of carbonic-acid gas in arterial blood. Its reduction in

the blood of rabbits, the temperature of which is artificially raised by detention in a warm chamber, is explained by the increased frequency of respiration and increased pulmonary transpiration. The diminution observed in the course of septic fever does not bear a causal relation to the elevation of temperature.

Production of Heat in Fever.—As a result of a series of experiments with rabbits, in which pyrexia was produced by injections of tuberculous sputum, infusions of hay, etc., Rosenthal,¹ by means of air-calorimeter, has demonstrated that, while the temperature was rising the dissipation of heat by the body was diminished. The calorimetric experiments also failed to show that, during the onset of the fever, there was any increased production of heat.

The Significance of High Temperature.—Smart²²² concludes a summary of the subject of pyrexia with the following propositions: (1) the animal temperature is not a reliable index of tissue-change; (2) it is by no means a certain indication of the gravity of the disease; (3) pyrexia is, in some degree, to be considered a conservative process not to be checked; (4) the mere control of the temperature by any method, without attention to co-existing conditions, is not productive of good, but often of evil; (5) the use of the synthetic antipyretics should be limited to short periods and selected cases.

State of the Tendon Reflexes in Febrile Diseases and Under the Influence of Psychic Impressions.—Longard¹⁰⁰⁵ has observed that, in febrile disorders and in conditions of exhaustion, there may be an exaggeration of the tendon reflexes. Ankle-clonus was found strikingly common in phthisical patients, without exaggeration of other tendon reflexes. In several cases of pneumonia, at the height of the disease, during the delirium, the knee-jerk was absent, while subsequently the tendon reflexes were exaggerated. In a case of paralysis of the palate and of the ciliary muscle following diphtheria, with hyperesthesia and hyperalgesia, the tendon reflexes were exaggerated, as they were also in cases of hysteria and neurasthenia during the stage of ecstatic excitement, subsiding when a condition of calm was restored. A similar manifestation was observed in the excited insane.

*Influence of Fever upon the *Bacillus Coli Communis*.*—Bard and Aubert^{383, 112} have found the bacillus coli communis in associa-

tion with other bacteria in the faeces of persons free from fever, but in 2 cases of tuberculosis attended with high fever they found the bacillus coli alone. The conclusion is, that the high temperature causes the death of all bacteria but the bacillus coli. This corresponds with the observation that the bacillus coli is found in pure culture in the stools of patients with typhoid fever; so that the presence of the germs is not the cause but the consequence of the fever.

Hyperpyrexia.—Kahler¹¹⁴ _{V.19, No. 1, July} reports a case which seems to indicate the non-dependence of the pyrexia of acute rheumatism upon the joint-lesion. Frodsham and Steedman⁶ _{Oct. 31} had a case of acute rheumatism in a man 62 years old, in the course of which the temperature rose to 106° F. (41.1° C.), the patient became unconscious and livid, the breathing became stertorous, and dissolution seemed impending. As a last resort, it was decided to put the patient in a cold bath. Some brandy was administered, and the man was immersed in water of a temperature of 44° F. (6.7° C.). The temperature of the patient gradually declined, but on the following day again rose to 105° F. (40.6° C.). It subsequently became normal, and recovery ultimately took place. Katzenbach¹ _{J. Am. Med. Ass.} records the case of a man 76 years old, with a rheumatic ancestry and a previous history of rheumatism, in whom, in the course of an attack of acute rheumatism, complicated by pericarditis and pneumonia, the temperature became hyperpyretic, fifteen minutes before death reaching 108.9° F. (42.7° C.).

Carrier⁸⁴⁶ _{Ap.} has reported the case of a woman 24 years old, with a tuberculous family history, who applied for treatment on account of a papular cutaneous eruption. The husband of the woman also presented a cutaneous eruption, while the woman had had a miscarriage followed by puerperal inflammation. Diseased ovaries and tubes were removed by laparotomy. While under observation a number of joints became swollen, painful, and tender, and purpuric spots appeared upon their surface. On two occasions the woman's temperature reached 108° F. (42.2° C.), and on two others 109.6° F. (43.2° C.) and 110° F. (43.3° C.), respectively. Nausea, vomiting, constipation, tympanites, and abdominal pain developed. An exploratory laparotomy was performed, but nothing abnormal was found. The woman ultimately recovered, the subsequent treatment having been symptomatic.

What would be 3 extraordinary cases of hyperpyrexia, if the possibility of deception were with certainty excluded, have been recorded. Galbraith⁶¹ has reported the case of a young woman in whom he observed the thermometer register a temperature of 151° F. (66.2° C.), while it is stated that, according to an observation made by a nurse, the thermometer on one occasion registered 171° F. (77.3 C.). Jones⁷⁴ has related the case of a girl, 14 years old, in whom the thermometer on one occasion registered a temperature of more than 150° F. (65.6° C.). In the course of the observations numerous thermometers were broken. In neither case was the apparent hyperpyrexia attended with evil results. Duckworth¹³² has recorded the case of a woman, 26 years old, in whom the thermometer is stated to have registered a temperature of 228° F. (108.9° C.), and in whom a large number of fragments of bone were removed from a two-horned uterus.

Pyrexia with Temporary Endocardial Bruit.—Pearse²⁶ reports 1 case each of tonsillitis, influenza, and bronchitis, in children 6, 10, and 12 years of age, respectively, in which, when the temperature in the one case was 101.6° F. (38.6° C.), in the second 102° F. (38.9° C.), and in the third 99.4° F. (37.4° C.), a systolic bruit was temporarily to be heard in the praecordia. The transitory murmur is ascribed to molecular or chemical changes in the blood.

Water.—Valentini⁶⁹ recommends copious libations of water in infectious diseases. The good results that attend this adjunct to treatment are manifested by general improvement, by clearing of the sensorium, by increased secretion of urine, by removal of thirst, and by a lowering of the temperature. Lynch⁸¹ reports the employment of the hand-spray in the course of typhoid and malarial fevers, and in all conditions of hyperpyrexia in which an immediate reduction of temperature is necessary and the action of the heart is too feeble to warrant the administration of antipyrin, phenacetin, or antifebrin. With an apparatus capable of producing a continuous spray, he has used a solution composed of spiritus ammoniae aromaticus, 1 fluidrachm (3.75 grammes); sodii chloridi, 1 drachm (3.89 grammes); aquæ, q. s. ut fiat 1 pint ($\frac{1}{2}$ litre). The spray is directed to one portion of the body at a time, which is dried by an assistant while another portion is being treated. After the patient has been thoroughly dried, he is covered

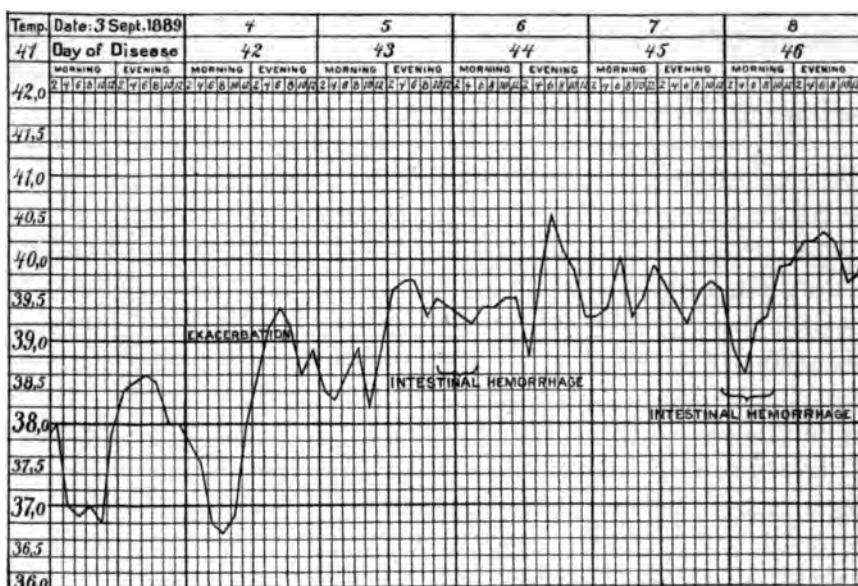
with a blanket, and soon falls into a calm, refreshing sleep, which is followed by perspiration, a lowering of the temperature, and a stronger and less frequent pulse. The relief thus obtained is but temporary, but does manifest good, and is a decided gain.

As the outcome of observations made upon himself, Forest⁵⁹ _{Sept. 19} found that from 12 to 20 ounces (360 to 600 grammes) of warm or hot water can be retained at one time in the colon, all of which will be absorbed into the blood. The mere flushing of the colon with not less than 2 quarts (2 litres) of hot water acts as a powerful stimulant to the kidneys. As a result, the usual quantity of urine secreted by the kidneys may be more than doubled. The result is partially due to the internal application of heat and partially to the absorption of the fluid.

Diaphoresis.—Queirolo⁵⁷ _{Nov. 30, 1900} reports that intra-venous injections of the sweat of individuals with infectious diseases (typhoid fever, variola, malaria, etc.) gives rise in lower animals to symptoms of intoxication, which appear whether the sweat be sterilized or not. In cases in which hot-air baths had been given as a therapeutic measure, both pulse and fever were favorably influenced; in some cases the paroxysms of malaria ceased; in typhoid fever the symptoms moderated. In the discussion Farina stated that in Africa he had had the opportunity of clinically observing the importance of diaphoresis in infectious diseases. In cases of typhoid fever, measles, and swamp fever that had received no medicinal treatment he had seen decided improvement and recovery merely as a result of profuse perspiration in consequence of the extreme heat.

Antipyresis Following Transfusion of a Solution of Sodium Chloride.—Kirstein¹¹⁴ _{18, 19, 24} reports the exceedingly interesting case of a man, 22 years old, who was admitted to the City Hospital of Cologne on the twenty-first day of an attack of typhoid fever. The tongue was dry; roseola was present; the spleen was enlarged; there was slight meteorism, with gurgling and characteristic stools. The sensorium was dulled, but there were no special complications. The temperature on admission was 39.4° C. (98.4° F.), and pursued a continuous course, not yielding to repeated doses of quinine, or to baths at temperatures varying from 22° to 18° C. (71.5° to 64.7° F.). At the end of nine days the occurrence of morning remissions seemed to mark the beginning of a subsidence by lysis,

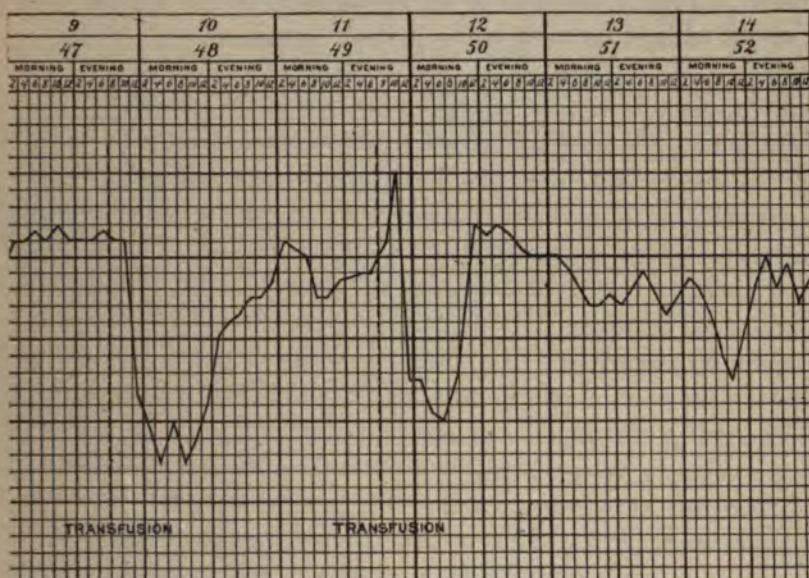
but the decline was not maintained. On the evening of the forty-second day of the disease, without recognizable cause, the temperature rose to 39.4° C. (102.8° F.). On the following morning it was 38.2° C. (100.8° F.), in the evening 39.7° C. (103.4° F.). Subsequently the temperature was again continuous. On the night of the forty-third day decided intestinal haemorrhage occurred. Despite treatment with opium, plumbic acetate, and tannin a second profuse haemorrhage occurred on the morning of the forty-sixth day, with manifestations of collapse. The tempera-



TEMPERATURE CHART OF KIRSTEIN'S CASE.
(Zeitschrift für klinische Medicin.)

ture rose above 40° C. (104° F.). The skin and mucous membranes were blanched, the pulse was extremely frequent and small, the patient complained of noises in the ears and of vertigo, and the heart became so enfeebled that death seemed imminent. As a final resort, the median vein was ligated at the right elbow, an incision made into the vessel to the proximal side of the ligature, and, through a fine-glass cannula fastened into the opening by another ligature, 600 cubic centimetres (20 ounces) of a 0.6-percent. solution of sodium chloride, at the temperature of the blood, was slowly transfused. The vein was then ligated to the proximal

side of the opening, the cannula withdrawn, and an antiseptic dressing applied. Immediate improvement was observed, the pulse became moderately full and reduced in frequency from 160 to 132, and the patient fell into a quiet sleep. On the following morning the temperature had fallen to 37.5° C. (99.5° F.), but gradually ascended again in the course of the next day or two. To determine whether or not the transfusion held a causative relation to the decline of temperature a second transfusion of 750 cubic centimetres (24 ounces) of a 0.6-per-cent. solution of sodium



TEMPERATURE CHART OF KIRSTEIN'S CASE.
(*Zeitschrift für klinische Medicin.*)

chloride was practiced through a vein of the left forearm. This was followed by an immediate rise of temperature to 41° C. (105.8° F.), with a subsequent decline to 38° C. (100.4° F.), the pulse and general condition suffering no disturbance. Two days later morning remissions set in, and the temperature gradually declined until it reached the normal on the sixty-third day, when convalescence was established.

While it may be admitted that moderate pyrexia is a conservative process and ordinarily requires little therapeutic consideration, it is clearly recognized that hyperpyrexia, particularly if

maintained, is a dangerous condition, which demands the most serious attention. Recognizing the existence of a toxic state, the indication is to eliminate, neutralize, or attenuate the circulating poison rather than to add to the intoxication by the administration of drugs not having specific antidotal properties. For these salutary purposes we have as yet no better agent than cold water, whether applied to external skin or mucous membrane, or directly or indirectly introduced into the blood, and whether given in the form of the bath or as drink or as enema, or by transfusion or infusion. Potent for good in the treatment of the febrile process, the agent cannot be used without discrimination.

GENERAL CONSIDERATIONS.

(From the ANNUAL for 1893.)

Thermotaxis in Fever and Under the Influence of Antipyretics.—Stern¹¹⁴ has made a study, in man, for the purpose of determining the accuracy of the doctrine of Liebermeister, that the essence of fever lies in a displacement of the heat-regulation to a higher level. As in health there is provision against variation in temperature, in consequence of the influence of exposure to heat or cold, so in the febrile state there is a tendency for the temperature to maintain its elevated level. If an attempt be made to artificially reduce this level, the body sets other processes in action, in an endeavor to prevent this reduction. Thus, the body protects itself against elevation of temperature by diaphoresis and against reduction of temperature by involuntary muscular contractions, resulting in an increased production of heat. The persons under observation were placed in a bath at the temperature of the body, the temperature being changed gradually, in order to avoid all cutaneous irritation. The occurrence of sweating was taken as an index of the counter-regulation against a lowering of the temperature, and involuntary muscular contractions as an index of the regulation against elevation of temperature. Observations upon healthy persons showed that a counter-regulation—as indicated by sweating—was manifested when the rectal temperature was raised from 0.1° to 0.8° C. (0.18° to 0.144° F.), and that involuntary muscular contractions occurred when the rectal temperature fell to the same degree. Persons hardened to cold reacted less delicately, a temperature-reduction of 0.8° C. (0.144° F.) being required to cause muscular twitching. A febrile patient, with a fairly constant temperature, responded similarly to changes of temperature,

though, perhaps, less actively than a person in health. The former was also more readily cooled, and, perhaps, more readily warmed, than the latter. If the temperature of a febrile patient rises rapidly, the nervous centres are often already adjusted for the higher temperature, while the body is yet considerably cooler. There is a sense of decided chilliness; the body endeavors to attain the new temperature constant as speedily as possible. This is facilitated by artificial warmth by means of warm bathing, which is most efficient under these circumstances. The conditions are reversed if there is rapid decline of temperature. The oppressive sense of heat is relieved by cold baths. In the case of febrile patients, the antipyretics reduce the heat-regulation to a lower level. The body strives to give off its excess of heat speedily. This is facilitated by a cold bath. It is, therefore, wise to conjoin cold baths with the administration of antipyretics. Antipyretics, in active doses, do not influence the intrinsic heat in healthy persons; they do, however, render the heat-regulation more sensitive and increase its capability. The temperature thus displays a tendency to pursue a straight line. Other conditions of elevated temperature, such as overheating by elevation of the surrounding temperature, poisoning with β -hydronaphtholamin, injury of certain parts of the nervous system, are attended with elevation of temperature and increased metabolism of albumen—as is fever—but are to be distinguished by the fact that they are not associated with an alteration of the heat-regulation, but with an insufficiency of the adjunct forces of heat-regulation. Such animals do not oppose any resistance to their elevation of temperature, and submit to reductions of temperature to the normal, or lower, before the counter-regulation makes itself manifest. True fever may be associated with a non-febrile elevation of temperature. Then the non-febrile plus of heat may be eliminated by cold baths, without the manifestation of a counter-regulation, although there may be considerable reduction of temperature. There then remains the true febrile temperature; if the reduction of temperature is continued, the counter-regulation appears, and furnishes an index of the temperature for which the heat-regulation is adjusted.

The Blood During Fever.—Stein, of Vienna,³¹⁹ has made examinations in 168 persons to determine if the blood undergoes any

distinctive changes in the febrile process. In some cases the number of corpuscles was counted; in most cases the quantity of haemoglobin was measured and the specific gravity taken. The examinations were made before and after defervescence (spontaneous or medicinal), and before and after the action upon persons without fever of agents that cause vascular dilatation, such as antipyrin, antifebrin, and pilocarpine subcutaneously. In 14 cases of the first category the examinations were made (1) in anticipation of the fever, (2) during the febrile period; in 11 cases (1) during the febrile period, (2) during spontaneous defervescence; in 63 cases (1) during the febrile period, (2) with the beginning of the action of an antipyretic, as antipyrin, antifebrin, or salol. The first group of 14 included 2 cases of sepsis, 8 cases of influenza, and 4 febrile cases in which spontaneous remissions took place. The blood was examined when the temperature was normal, and again when it was elevated. The intervals between examinations were made as short as possible. In 9 cases elevation of temperature was attended with increased specific gravity; in 5 cases there was no noteworthy alteration. In 11 cases of spontaneous defervescence the specific gravity of the blood became less as the temperature became normal. The findings in the cases of febrile persons treated with antipyretics were not so constant. Of 63 such cases, a lowering of the specific gravity was observed in 39, with the decline of the temperature; in 9 no change was observed; in 15 there was a slight increase in the specific gravity. Here it appeared as if the time element was important, and as if with increased intensity of action of vaso-dilator and diaphoretic agents more rapid changes in the specific gravity occurred. Examinations were made in 80 persons in practically normal condition, before and after the action of agents that caused vascular dilatation: in 53 a more or less decided lowering of the specific gravity was observed, in 8 there was no change, and in 19 there was an increase in the specific gravity. In the great majority of cases changes were observed in the concentration of the blood. Elevation of temperature was in most cases followed by increased density of the blood; spontaneous decline of temperature was always, and medicinal lowering of temperature in most cases, followed by lowered density. It is thus seen that changes in temperature are attended with changes in the lumen of the vessels, and in most cases with

changes in the density of the blood. The results were not quite as clear when dilatation of the vessels was brought about medicinally in persons without fever. In most cases dilatation of the vessels was accompanied with lowering of the density of the blood. In consequence of the large number of deviations from this result, however, it is difficult to come to a definite conclusion in this connection. Perhaps the cases in which numerous examinations were made during the brief continuance of the action of pilocarpine may afford an explanation. These showed, on several occasions, a variation in the density with a return to the previous level after profuse perspiration, perhaps in connection with the amount of fluid immediately available in the organism.

Anomaly of Axillary Temperature.—Hattie, of Halifax,²² has reported the case of a man, 21 years old, who received a blow in the left temporal region, causing a fracture of the skull, with immediate loss of consciousness. He was able to be about in a few days, but was irritable and suspicious of those about him. These symptoms continuing, the head was trephined, and a large clot of blood was removed from between the dura and the bone. The operation was followed by an acute maniacal attack, after the subsidence of which the mental symptoms began to improve slowly and the man was sent to his home. The improvement was but temporary, and a second operation was performed, without, however, finding a cause for the symptoms. Slight improvement also followed this operation, but the man soon became cross and irritable and suspicious that those about him were conspiring to kill him; at times he was inclined to be violent and abusive. While under observation he had a febrile attack, which it was suspected was dependent upon an exacerbation of a latent, undetected tuberculous process, for which suspicion, however, there was not adequate evidence. During this attack the axillary temperature differed on the two sides of the body, being almost invariably higher on the right side (*i.e.*, the side opposite that of the injury) than on the left. In explanation of this anomalous phenomenon, it is suggested that a hypothetic heat-centre in the cortex cerebri, close to the motor area, had been injured.

Means of Taking the Temperature Speedily.—Hausmann⁵⁷ succeeded in obtaining reliable records of the temperature by holding the bulb of the thermometer before the orifice of the urethra

while the patient urinated. He admits the limitations of the application of the method, but claims as advantages the rapidity with which the observation can be made and the assurance afforded against deception. He has found that the temperature taken in this way is 0.3° or 0.4° C. (0.54° to 0.72° F.) lower than the rectal temperature, 0.1° or 0.2° C. (0.18° to 0.36° F.) lower than the temperature of the mouth, and 0.2° or 0.3° C. (0.36° to 0.54° F.) higher than the temperature of the axilla.

Post-Febrile Insanity.—Hurd, of Baltimore, ¹⁰⁴ May 28 considers the cases of insanity that follow various acute and febrile conditions in three groups: those that result from shock, those that result from intoxication by specific poisons, and those that result from anæmia and nervous exhaustion. The first group includes cases of confusional insanity due to surgical operations, childbirth, the puerperal state, etc. There is usually a history of great mental strain or anxiety, sleeplessness, delirium, hallucinations of hearing or sight, delusions of apprehension, and often great mental disturbance. The insanity develops suddenly, as a rule, and runs a rapid course, generally terminating in recovery, but sometimes in chronic insanity, and even in death. The insanity dependent upon specific poisons includes the delirium of fevers, both intermittent and exanthematous; of pneumonia; of uræmia; the transient insanity of influenza; the mental confusion of multiple neuritis; the delirium of iodoform, salicylic acid, and chronic alcoholic intoxication; and the delirium of puerperal fever. Under these conditions there is produced an active delirium, which is self-limited and disappears with the removal of the exciting cause. The insanity resulting from anæmia and nervous exhaustion is to be regarded as the expression of an exhausted physical state. It is attended with delusions of fear and apprehension; hallucinations of sight and hearing; perversions of taste, of cutaneous sensibility; and frequently progressive stupidity and mental impairment. The treatment must primarily be prophylactic. Delirium is, as much as possible, to be prevented. The Brand method of treatment seems to exert a beneficial influence in this direction. Something also can be accomplished by rest, quiet, and nutrition. The patients under consideration should not sit up prematurely, should not early receive visitors, or be exposed to mental strain. For the treatment of the developed disease, rest, quiet, nutrition, hypnotics,

massage, good nursing, and careful personal attention are required. Asylum treatment is not to be recommended, unless imperatively necessary. The opinion is expressed that the term "post-febrile" should be restricted to those forms of insanity that follow exhausting diseases like enteric fever and the exanthemata. It should not be applied to the toxic conditions that give rise to prolonged delirium; neither is it to be replaced by the name "confusional insanity"; the latter term may be accurately employed to describe the forms of insanity that arise in the course of active diseases.

GENERAL TREATMENT OF FEVERS.

Bremner ¹ _{May 22} recommends a hot-blanket pack in the treatment of the febrile condition. A blanket large enough to completely envelop the patient is folded twice lengthwise, then rolled up into a moderately tight roll. Two ounces (62 grammes) of good soap are, by boiling, dissolved in 2 quarts (2 litres) of water. The boiling solution is then poured into the centre of the ends of the roll of blanket, which is from time to time manipulated to facilitate its thorough saturation. Upon one-half of the patient's bed, or upon a cot by his side, is placed a sheet of rubber cloth, and upon this a large, dry, double blanket, so arranged that it may subsequently be made to completely and thoroughly surround the patient's neck. The patient is undressed, and has a blanket loosely thrown about him. All being in readiness, the roll is laid at the foot of the bed or cot, and quickly unrolled from below upward and spread upon the dry blanket. In a few seconds, in accordance with the degree of heat of the pack, the patient is placed upon the middle of the wet blanket, in which he is thoroughly wrapped, and over which the dry blanket is snugly applied. The blankets are well tucked in about the arms and legs. If the feet manifest a disposition to be cold, hot-water bottles should be applied. If the bedroom is cold, an additional blanket may be employed. It is well to apply an ice-bag to the head, or cloths wrung out of ice-water may be kept constantly applied to the temples. The patient should be generously supplied with cold water to drink. The pack should be continued for from one to two hours, according to the degree of temperature and the feelings of the patient. Children often fall asleep during the application. The temperature soon falls, and, if the patient has been delirious or comatose, intelligence

returns more or less completely. The pack should be repeated twice or thrice daily until the temperature remains permanently below 101° F. (38.3° C.). On its removal, the patient should be gently rubbed with a soft towel and replaced upon the ordinary bedding.

Carter¹⁸⁷ has reported the case of a man, 31 years old, who was being treated for a condition not specified, but in which hyperpyrexia was not anticipated, and in which the temperature rose to 108.5° F. (42.5° C.). Consciousness was lost; internal strabismus was present; the pulse could not be counted; the face was full, red, and congested, and the skin was sweating profusely. It was agreed to strip the man, and apply in rapid succession cloths immersed in ordinary cold water until ice could be obtained, and, to inject into the rectum 20 grains (1.3 grammes) of quinine sulphate and 1 fluidrachm (3.70 grammes) of tincture of digitalis in 2 ounces (60 grammes) of water. In an hour the rectal temperature had fallen to 104° F. (40° C.). As the temperature fell the man slowly became conscious and, after a few days, in which sleeplessness was a prominent symptom, and during which a second threatening rise of temperature required a second external application of cold, was quite well. Hopkins, of Milton, Del.,¹²¹ recommends, as an adjunct in the reduction of febrile temperature, that cold water be poured in a small stream from a height of one or two feet upon the wrist for a few minutes. Cadogan-Masterman²⁶ commends the employment of alcohol for the reduction of temperature. If the thermometer rise above 103° F. (39.44° C.), he gives spirit of wine—say, a drachm (3.70 grammes)—freely diluted, every two hours, or $\frac{1}{2}$ ounce (15 grammes) of whisky, in the same way. The tongue may be taken as the index for the use of the agent. If it be dry, the alcohol should be given; otherwise it is to be omitted. The recommendation is based upon the view that the administration of alcohol diminishes heat-production by checking the combustion of the body-compounds of carbon and hydrogen.

The increased specific gravity of the blood noticed at the height of the febrile process may be attributed to undue combustion of the watery element, while the fall of density in defervescence may be due to renewed taking up of water by the blood-vessels. When the termination of the febrile process is attended

with perspiration the loss of water by transudation must give rise, temporarily at least, to increased density of the blood. That the profound and wide-spread functional, nutritional, and even structural changes brought about by the febrile process should at times lead to the development of insanity cannot be viewed with surprise. Delirium, it is well known, is a rather common manifestation, and should receive due attention. In the absence of hereditary tendencies and other predisposing influences the prognosis of so-called post-febrile insanity should be good, and recovery result, as a rule.

GENERAL CONSIDERATIONS.

(From the ANNUAL for 1894.)

In the absence of anatomical demonstration Herz⁵⁷ does not admit the existence of thermo-regulatory centres. The theory of heat-retention and increased heat-production also is not satisfactory. As under febrile conditions the entire organism suffers, every cell likewise suffers; so that fever is to be viewed as a property of the protoplasm itself. It is difficult to understand that such a process should occur only in the most highly organized and not in the lowest forms of protoplasm as well. The opinion is expressed that febrile elevation of temperature is a product of the protoplasm, and it has been demonstrated that every cell in the animal kingdom is capable of warming itself. Experiments were made with yeast-cells, and numerous analogies found to exist between these and the cells of mammalian organisms. An apparatus was constructed by means of which the metabolism of, first, the healthy and, then, the diseased yeast-cell was studied. It was found that the infected yeast-cell generated a larger amount of heat than the healthy cell. The investigations showed, further, that there is no organism that regulates its own warmth. The addition of menthol to the fermenting fluid caused the temperature to decline to the normal. It is believed to be thus demonstrated that manifestations can be induced by infection of lower organisms similar to those observed in febrile animals, though the position is not taken that the yeast-cell is capable of displaying fever.

Obelar²⁹⁷ has reported the case of a woman, 32 years old, with a tuberculous family history, who had been losing flesh for several months and presented moderate fever, frequent cough, excessive diarrhoea, and night-sweats. A sudden aggravation of

the condition taking place, the temperature was found to be a little above 45° C. (113° F.). On the next day another, standardized, thermometer recorded a temperature of 46° C. (114.8° F.). On the evening of the same day the thermometer first used, placed in the axilla, recorded a similar temperature; the instrument broke in consequence of the undue expansion of the mercury. A temperature of 46° C. (114.8° F.) persisted for some time, except upon one evening, when the thermometer recorded 42.3° C. (108.1° F.). The measurements were made at various times of the day, and with the greatest care. Four different thermometers yielded the same results. The sensorium of the patient was undisturbed. The opinion is expressed that a condition of pyæmia existed, perhaps as the result of a communication between a pulmonary cavity and the general circulation.

Keating, of Colorado Springs,⁴⁵¹ ~~Dec., 1911~~, calls attention to a tendency to hyperpyrexia manifested by cases of febrile conditions observed at high altitudes. Children suffering from slight forms of indigestion display temperatures and nervous symptoms that at sea-level would occasion concern, the general appearance and the general condition, however, not being affected correspondingly. On the other hand, subnormal temperatures are also said to be not infrequent, as, for instance, after labor. The explanation is suggested that this peculiarity of the temperature may be dependent upon nervous influences, related to the atmospheric conditions at high levels. Freund⁴⁵², administered to a patient with intermittent fever phosphoric acid during the intermissions, with the result that the phosphates in the urine were increased. As soon, however, as the cold stage of the fever came on the phosphates disappeared from the urine, and only regained their ordinary quantity after the lapse of some hours. It is concluded, therefore, that the absence of phosphates is due to their retention in the system rather than to suppression of the metabolic changes to which their excretion is due.

GENERAL CONSIDERATIONS UPON TREATMENT OF FEVER.

In a review of the question whether or not it is desirable to relieve pyrexia by the administration of antipyretics Armstrong⁴⁵³ takes the ground that fever is the expression of some disturbance of the thermal centres. While this disturbance may be traumatic, it is usually the result of the presence in the organism of certain

autogenetic or heterogenetic (infectious) products that have the same affinity for the thermal centres as certain vegetable alkaloids have for certain cerebral centres. Fever does not exercise any beneficial effect in limiting an infectious process; this is demonstrated clinically by the occurrence of cases of infectious disease that pursue their usual course without any rise of temperature. It is the general experience of clinicians that the relief of fever exercises a beneficial influence on the general condition of the patient, though the apyrexia does not indicate that the cause of the pyrexia has been removed. In many febrile conditions the causative principle has produced a thermotoxic paresis that is at once relieved by some suitable antipyretic. In continuing the employment of antipyretics sight should not be lost of the possibility of obtaining, either synthetically or derivatively, compounds that will, when administered in the specific diseases, have the same inhibiting influence on the further development of the micro-organisms of those diseases that certain alexins, toxalbumens, or toxins have. The action of such compounds should be as specific in each infectious disease as is the action of quinine in paludal fevers.

Ssokolow ⁵⁸⁶_{Nov. 14, 16, 21; Sept. 2} records the results of observations made upon fifty healthy and thirteen febrile children to determine the effects produced by the administration of quinine, antipyrin, sodium salicylate, each in doses of 0.5 grammie ($7\frac{1}{2}$ grains); phenacetin, in doses of 0.25 grammie (4 grains); antifebrin, in doses of 0.3 grammie ($4\frac{1}{2}$ grains). It was found that in healthy children antipyrin most increased the cutaneous transpiration; next in activity was phenacetin; while sodium salicylate and quinine exerted scarcely any influence whatever, and antifebrin caused a diminution. In febrile children antifebrin increased the perspiration most; antipyrin not to the same degree; while sodium salicylate, quinine, and phenacetin caused suppression of the secretion. In enteric fever the cutaneous transpiration was found to be greater than normal. Barr, of Calamine, Tex., ¹⁰⁹_{June} concludes that acetanilid reduces febrile temperature by virtue of its power to surrender up the water that holds it in solution and to again assume the crystalline form.

Sciolla ³_{Apr. 14; May 27} has observed that the application to the skin of the abdomen, back, chest, or extremities of from 30 minims

(2 grammes) to $2\frac{1}{2}$ drachms (10 grammes) of tincture of guaiacol in febrile cases is followed by a reduction of temperature. The action is accelerated when the part to which the application is made is enveloped in gauze covered with gutta-percha tissue. Deservescence is usually accompanied by perspiration, but without cyanosis or other alarming symptoms. Thus administered, guaiacol is eliminated by the kidneys in the form of guaiaco-sulphuric ether, which appears in the urine about an hour after the skin has been painted. The application may be repeated several times in the course of twenty-four hours.

Humphrey, of Fairbury, Neb., ¹⁶⁸ _{Apr.} reports that, in the treatment of fevers at an altitude of from 1000 to 1300 feet or more above sea-level, he deals with the febrile condition by means of relaxing and diaphoretic remedies. A favorite prescription contains fluid extract of gelsemium, 1 fluidrachm (4 grammes), and water sufficient to make 4 fluidounces (125 grammes), of which a teaspoonful is given every hour. In some cases aconite is used; in others veratrum viride or belladonna. The room is kept at a temperature calculated to facilitate diaphoresis.

ENTERIC, OR TYPHOID, FEVER.

(From the ANNUAL for 1888.)

Etiology.—Brouardel³⁸ relates the details of a localized outbreak of typhoid fever in which the specific bacillus was found in the contaminated water.

During the months of August and September, twenty-three persons had occupied three contiguous houses at Pierrefonds, of whom twenty were attacked with typhoid fever. Four members of one family died. Insanitary conditions of the most aggravated kind existed. The water-supply was from shallow wells filled by percolation from a neighboring stream. One cess-pool was situated at a distance of thirty feet from a well, the other at a distance of sixty-five feet. The soil was light and porous, and the level of the water was below that of the cess-pools. Characteristic bacilli were found in the water supplied to the house in which the four deaths had occurred.

In cultures of the material obtained by punctures from the spleen of one of the patients, colonies developed presenting the same morphological and biological characters as those obtained from the well-water. The coloration and sporulation of the bacilli were identical.

Vidal and Chantemesse³⁹ contend that the central clear space, seen in typhoid bacilli, is not characteristic, as Artoud supposed, for it is found in other bacilli, especially in those of old cultures, and it is, they believe, the beginning of the death of the microbe. Spores are produced between 37° and 38° C. It does not liquefy gelatine, but is easily cultivated on potato. Gaffky was unable to find the bacillus in the living subject or to inoculate it. Vidal and Chantemesse have found it during life by making capillary punctures of the spleen, and they have been able to inoculate both mice and guinea-pigs, and have subsequently found the bacillus in the abdominal viscera and lungs. In a case in which a typhoid patient aborted at the fourth month, the bacillus was found in the placenta. Hallopeau,⁴⁰ Lardier and others contributed reviews of existing knowledge upon the same subject.

Fraenkel⁴¹ reported a case in which a patient who had had

typhoid fever, followed by relapses at intervals of six weeks and four months, developed some time afterwards an abdominal tumor. Upon aspiration a quantity of pus was evacuated, and in it were found typhoid bacilli, the cultures of which were characteristic. He regarded the case as one of inflammation produced by the persistent typhoid bacilli, which had failed to undergo attenuation at the close of the initial paroxysm, as is usual.

Wiltschur⁴² has tested the action of boiling water upon cultures of typhoid bacilli. He finds that twice the volume of boiling water will destroy the bacilli, and three times their volume will destroy their spores; that from two and a half to three times their volume destroy the bacilli in stools, and that four times their volume is sufficient to destroy their spores.

A recent epidemic of typhoid fever at Mount Holly, N.J., has been ascribed to improperly constructed cess-pools at a settlement called Smithfield, which contaminated the Rancocas River, from which the water supply of Mount Holly is derived.⁵³

Pathology.—“In an Amsterdam graduation thesis, by Dr. M. Neimeijer, on the Statistics of Typhoid Fever, out of 50 cases in which complete observations were recorded, prodromata occurred in 25, rigors in 16, “cold shivering” in 1, pain in the left side in 7, diarrhœa in 42, splenic enlargement in 48, rash in 47, ileo-cœcal gurgling in 19, and pain in the same region in 20, bronchial catarrh in 43, albuminuria in 12, in 3 of which cystitis followed. In 63 cases, relapses occurred 6 times. With regard to complications, out of 73 cases, intestinal haemorrhage occurred in 5; peritonitis in 3, perforation occurring in 2 of these. Other complications were: Pharyngitis, 1; acute follicular sore-throat, 1; parotitis, 1; epistaxis, 3; laryngeal perichondritis, 1; pulmonary infiltration, 13; pleurisy with effusion, 3; thrombus of the crural vein, 1; acute nephritis, 1, in a somewhat doubtful case; nephrolithiasis, 2; herpes labialis, 3; cutaneous haemorrhage, 3; periostitis of the tibia, 1; joint-affections, 3; meningitis, 1; neuralgia of the sole, 1; profuse perspiration, 2; polyuria, 1; mental disturbance, 4; deafness, 5; bleeding from the ear, 1. The total number of patients on whom observations were made was 194. Of these, 20, or 10.3 per cent. died, the male mortality being decidedly higher than that occurring among female patients,—12.5 per cent. as compared with 6 per cent.”

Willememminger⁴⁵ reports a case of typhoid fever in a girl six years old in whom about the beginning of the second week, characteristic symptoms of measles showed themselves. The case ran a favorable course.

This case is open to criticism. The editor of this department has on several occasions seen the characteristic rose-rash of typhoid fever so abundantly developed in childhood as to lead an incautious observer to make the diagnosis of measles.

Jencks⁴⁶ reports a case of atypical typhoid fever, and in a general discussion of the subject quotes a lecture by J. C. Wilson in which the atypical forms are classified as follow: (a) mild typhoid; (b) abortive typhoid; (c) typhoid of childhood [infantile remittent]; (d) typhoid of the aged; (e) cases of febrile intestinal catarrh, (f) cases of afebrile intestinal catarrh.

Mettler⁴⁷ considers gangrene occurring as a sequel of typhoid fever to be due to mechanical obstruction of the arterial branches, producing dry gangrene, or of obstruction of the artery and vein producing moist gangrene by coagulation of the blood. This coagulation, while favored by causes of a mechanical nature, is essentially due to endarteritis. The local treatment of endarteritis of typhoid fever consists in elevation of the limb, the application of leeches followed by hot stupes or if more agreeable to the patient, cold water dressings, poultices of chamomile flowers or decoction of poppy heads. The circulation should be supported by means of alcohol and digitalis. The peripheral circulation should be stimulated by alternate applications of heat and cold. For this purpose the constant current battery may be advantageously used. After all efforts, it may become necessary to make numerous incisions into the mortified tissues and follow by proper surgical dressings.

R. S. Archer⁴⁸ reported an interesting case of brachial monoplegia complicating enteric fever. Tissier⁴⁹ contributed an important paper upon the laryngeal complications in typhoid fever to which is added a full bibliographical index.

Weiss⁵⁰ reported the case of a soldier aged 22 years who died from profuse gastric haemorrhage about the beginning of the third week. This had been preceded by intestinal haemorrhage. The diagnosis of haematemesis due to the anatomical lesions of typhoid fever was based upon the following facts: At the time of the attack

of fever, the patient was in excellent health and had never suffered from gastric disease. He was not a drinker, had never had syphilis, and the heart and lungs were sound. There were no petechiae in the skin, and there had been no epistaxis; and, finally, a careful investigation of the naso-pharyngeal cavity revealed no lesion whatever. The source of the fatal haemorrhage was therefore the duodenum, the lower portion of the oesophagus or the stomach, and its cause, considering the previous physical condition of the stomach, was presumably typhoid ulceration.

Many observers have testified to the occurrence of typhoid ulceration in the stomach and its immediate neighborhood. Louis and Jenner observed typhoid ulcerations in the lower portion of the oesophagus. Röderer and Wagner described an oesophagitis follicularis, and Eichhorst and Reimer observed similar changes. Rokitansky noticed infiltration and even necrosis of the lenticular glands of the stomach, and Chauffar and Cornil described an infiltration of the mucosa and sub-mucosa with lymphoid cells, which may proceed to the formation of miliary abscesses.

Diagnosis.—Masse⁵¹ reviewed *in extenso* the present state of knowledge of typhoid fever as observed in the French possessions in Africa. The following table of the differential diagnosis between typhoid fever and the remittent or pseudo-continuous fever of the tropics is of importance:—

TYPHOID FEVER.

Commemorative.

No previous exposure to marsh miasm. The patient is usually between 18 and 25 years of age. If in the service, he is a new-comer. If in civil life, he has recently changed his abode. Season of the year, indifferent.

PRODRAMES.

Prodromes usually present. Loss of strength, indisposition to ordinary occupation, sense of fullness in the head, epistaxis, diarrhoea, loss of flesh, restless nights, insomnia alternating with disagreeable dreams, gastric derangement followed by headache, malaise, transient fever, vertigo and tinnitus aurium.

ONSET.

For several days, slight febrile movement with evening exacerbation. An

Previous exposure to marsh miasm. Age indifferent. Attack either vernal or autumnal.

Prodromes sometimes present, sometimes absent. When present, of short duration. Gastro-hepatic disturbances, headache, exhaustion accompanied by nausea, sometimes by vomiting. When there is prodromic fever, it appears during the day and is quotidian or double quotidian in most cases. Occasionally there is diarrhoea.

Onset sudden, without previous fever except perhaps transient paroxysms

abrupt onset with shivering followed by pyrexia, is rare.

occurring during the day with complete intermission. The onset is, as a rule abrupt, accompanied with shivering, headache and active febrile movement.

THE DEVELOPED ATTACK.

Facies pale, dull, depressed, rarely red and animated. Headache active, persistent, often retro-orbital. Dizziness and tinnitus, epistaxis, mental hebetude, sub-delirium or delirium during the night. Drawling speech. Tremulous tongue and lips. Pulse frequent. Temperature 38° C. to 40° or 41° C. Gradual rise, reaching the fastigium by a series of oscillations which occupy from three to six days, the temperature of the evening exceeding that of the following morning. Tongue coated in the centre, red at the point and borders. Abdomen full and tympanitic, chiefly so in the hypogastrium. Tenderness upon pressure in the right iliac fossa, where there is also frequently spontaneous pain. Borborygmi. Rose spots. Hypertrophy of the spleen ordinarily difficult to recognize in the first days. Diarrhoea as a rule, constipation is the exception. Thirst, anorexia. Nausea and vomiting unusual.

Sibilant and sonorous rales on both sides of the chest, more distinct posteriorly.

Gradual progress of the sickness. Sudamina appear toward the end of the second week. Ataxic accidents, as delirium, coma, subsultus, adynamia, etc., together with stupor also occur toward the end of the second week, sometimes later. Grave disturbances of nutrition, rapid wasting.

Ten or fifteen grams of the morning urine treated with four or five grams of nitric acid, shows at the bottom of the glass an indigo diaphragm, often accompanied in grave cases by a second diaphragm, which is white composed of albumen and separated from the first by a bed of urine more or less thick. Sometimes there is a third diaphragm, which is also white and formed of uric acid and separated from the diaphragm of albumen by a bed of urine.

Face injected or of a somewhat earthy hue, rarely pale. Intense headache, likewise often retro-orbital. Vertigo, tinnitus and epistaxis, all rare. Intelligence more acute. Delirium and sub-delirium rare. Speech more natural. Absence of the trembling of the tongue and lips. Eyes and external integument icteric in bilious remittent. Pulse frequent, not dicrotic. Temperature 38° to 40° or 41° C. Course of the fever irregular and interrupted, with abrupt rises and incomplete remissions, the temperature of the morning often being higher than that of the evening. Tongue moist and white in the centre and red at the borders; covered with a yellowish coating in bilious remittent. Abdomen prominent, principally in the hypogastric region. Tender upon pressure in the epigastric and hypochondriac regions, and above all in the left hypochondriac. Borborygmi, rare. Rose spots, absent. Hypertrophy of the spleen difficult to recognize in the early days. Diarrhoea rare in the ordinary form of remittent, very common in bilious remittent. Constipation the rule. Great thirst, nausea, and in bilious remittent, vomiting.

Bronchial râles rare.

Course rapid. No sudamina, as a rule, but when present they appear in the first week. Stupor and ataxic accidents when they occur are early. Nutrition less profoundly disturbed. Emaciation moderate in ordinary remittent, but marked in bilious remittent.

The urine treated in the same manner, shows at the bottom of the glass a brown diaphragm. In the more serious cases, the brown diaphragm is found accompanied by a diaphragm of albumen from which it is separated by a bed of urine more or less thick. In a pronounced case of bilious remittent, there is formed with or without the diaphragm of albumen, a diaphragm of the coloring matter of the bile. Sometimes there is here likewise a diaphragm of uric acid.

TREATMENT.

Inefficacy or slight utility of the sulphate of quinine in uncomplicated typhoid fever. Convalescence slow. Very great utility of the sulphate of quinine. Convalescence rapid in ordinary remittent. Less rapid in bilious remittent.

PATHOLOGICAL ANATOMY.

Tumefaction and ulceration of the Peyer's patches and solitary follicles. Not the least tumefaction or ulceration of Peyer's patches or Bruner's follicles. Mesenteric glands unaffected. Enlargement of the mesenteric glands, etc., etc.

Massé concludes his paper with the following considerations regarding typhoid fever in Africa, according to historical periods:—

First Period.—In the earliest days, inflammatory fevers, typhoid fever and remittent fevers were frequently confounded, and were submitted to antiphlogistic treatment. This period is characterized by an abuse of general and local blood-letting in the treatment of these pyrexias.

Second Period.—This period began in 1836 and continued several years. It is the natural outcome of the reaction against the antiphlogistic treatment, in consequence of a closer study of fevers of paludian origin, and of a nicer appreciation of the nature of fever itself and the treatment applicable to it. The name of Maillot is inseparably connected with this period. The rational views of this period were distorted by the exaggeration of the influence attributed to paludism. There were only pseudo-continuous fevers, and typhoid fever disappeared, so to say, from the nosology of Africa. The abuse of the sulphate of quinia is characteristic of this period.

Third Period.—This we gladly name the scientific period. Typhoid fever is again recognized. It is studied methodically and compared with the dothienenteric of France, and found to be the same thing. An analysis of their respective symptoms shows remittent and typhoid fevers to be essentially different maladies. Sulphate of quinia largely used in remittent is less employed in typhoid, and then only to meet precise indications.

Present Period.—Without wishing to detract from the great utility of the discovery of the microbes of malaria from the standpoint of the differential diagnosis between the two forms of fever, we venture to say that in practice the diagnosis will be made in accordance with the precepts of traditional medicine. In fact the

serious and attentive study of the symptoms of each sickness, their order of appearance, and their relative value, the course and the nature of the affection itself, the etiology, etc., must always form the positive basis of an exact diagnosis from which alone can be derived the elements of a differential diagnosis.

According to G. Harrison Younge,⁵² in India the rule is always adopted of suspecting every case of continued fever to be one of enteric fever until it can be proved to be not so.

Spillman⁵³ contributes three cases of enteric fever in the course of which herpes labialis was observed. These cases disprove the view at one time held that the eruption in question did not occur in the course of enteric fever, and that its appearance in any obscure case precluded the diagnosis.

J. C. Wilson⁵⁴ reported a case of enteric fever in a precociously developed girl at the age of puberty, in which death occurred at the end of the first week from intercurrent fulminant peritonitis of pelvic origin.

At the autopsy the lesions of both of the above conditions were found. The peritonitis resulted from acute double septic salpingitis.

Money⁵⁵ confirms the assertion of Hughlings-Jackson that the knee-jerk, as far as his experience goes, is never absent in typhoid fever, whilst in tubercular meningitis its disappearance for a few hours or a day or a few days is by no means rare. A variable state of the knee-jerk, that is one day present, the next absent and the third increased, points to meningitis and not to typhoid fever. He makes what may be considered a curious comparison, and asserts that the differential diagnosis between meningitis and the essential fevers may be assisted far more by a study of the knee-jerk than by swelling of the spleen. For unless the splenic enlargement be enormous, tubercle as well as typhoid fever and other diseases—as, for example, pyæmia—will account for it; whereas absence of knee-jerk, or rather ascertained disappearance of the same, is probably never met with as the simple outcome of prolonged pyrexia.

I. E. Atkinson⁵⁶ presented a valuable paper on forms of typhoid fever simulating remittent malarial fever, and demonstrating the essential typhoid character of many common forms of fever not usually recognized as such. He considered it safe to

predict that the solution of diagnostic difficulties will be readily obtained through the rapidly increasing knowledge derived from bacteriological researches and culture observations. In the discussion of this paper, Councilman and Osler agreed with the author that we have in the microscopic examination of the blood a positive means of diagnosis.

Prognosis.—Bardat de Lacaze⁵⁷ discusses the subject of sudamina in typhoid fever especially from the point of view of prognosis. Sudamina are common enough in typhoid fever, as in other maladies attended by copious perspiration. Murchison, who observed sudamina in about one-third of his cases, attributed no special significance to them. In this he has been followed by most authorities. De Lacaze holds that the appearance of sudamina or malaria in the third week in severe cases is of favorable omen; that in a day or two the temperature will fall. Like eruptions appearing earlier, that is, during the second week, are of less significance.

Treatment.—Von Ziemssen's lectures on the treatment of typhoid fever, contain the following recommendations:—⁵⁸

The room should be quiet, large and easily ventilated, and have a small room adjoining in which baths can be given. It is important that there should be a second bed in the room standing near the patient's bed, into which he can be lifted when his bed is soiled or must be rearranged. Frequent change of bed is especially gratifying to most patients. The nurse should be trained, accurate, reliable and uniformly quiet. The temperature should be taken by a skillful hand. Nursing of the patients by female relatives is decidedly objectionable. No visitors should be admitted until convalescence is far advanced. The patient should not be allowed to move himself or get out of bed. Sudden death frequently results from a neglect of this rule. The greatest order and cleanliness should prevail in the sick room. A water mattress is indispensable in severe cases, especially if bed-sores threaten. The back should be rubbed once or twice daily with spirituous solutions, weak warm rum, cologne water, etc.

Dietetics constitute the most important part of the treatment. No pure albuminous food and still less fatty food should be given. We must adhere as closely as possible to the normal proportion of food stuffs for the healthy organism as given by Voit, with the

special consideration that fats are taken with difficulty by fever patients, best in milk, and that carbo-hydrates are not only best taken but best borne and markedly limit the consumption of the albuminous and fatty matters of the body. Frequent change and variety of flavor and consistence of food is desirable. The diet should be liquid. Starch, dextrine, and sugar may be given in various forms, both in food and drink. Thin oat and barley water are recommended. The flavor is varied by the occasional addition of sugar, cinnamon, wine, etc. Clear meat broths with or without the yolk of egg, meat extracts, etc., are available. Milk is the most complete mixture of albumen, fat and carbo-hydrates and is an excellent food in typhoid fever, but too much of it will cause uneasiness in the stomach. Von Ziemssen does not give more than one pint as a rule in the twenty-four hours. Freshly expressed meat juice, which consists, in fact, of serum, lymph and blood, forms an acceptable and highly digestible food. Of this about 150 or 200 grams may be used in the 24 hours. It may be given partly in spoonful doses like a medicine or partly admixed with soup, the temperature of which is not above 46° C., that is to say, 114.8° F. Frozen meat juice is also well borne. If eggs are administered in the soup, not more than three should be administered during twenty-four hours. A very judicious combination is yolk of egg with brandy. Light non-acid white or red wines are used from the beginning of the sickness to the extent of about one pint daily. Mulled wine may be given, tea with rum or brandy toddy, also jellies prepared from fresh calves' feet, with white wine. On account of their refreshing and pure taste they are very grateful to the patient. As a rule the food and stimulants must be proportioned to the severity of the disease. Food may be given every two hours, and drink and medicine between times. Feeding must be kept up through the night as well as the day. The diet of convalescence should follow the usual diet of health with certain modifications. The return to solid food should be as follows: First breakfast, tea with biscuit and one soft boiled egg. Second breakfast, 100 grams of finely minced raw bacon with wheat bread crumbs. Noon, 150 grams pigeon, young chicken, or partridge finely minced in soup. Later with a mild sauce and mashed potato and with wine or beer. In the afternoon, tea with biscuit or cakes. For supper mush and milk, two soft eggs and

some raw bacon. This may soon be followed by calves' feet for breakfast, then an English broiled beefsteak, mutton and preserves, and in the evening some strengthening soup and some beer. At this stage, when the patient thinks of nothing but eating, something new in the way of food must be given daily.

The only drug to which we can ascribe a kind of specific action is calomel, perhaps on account of its entire or partial change by the chlorine of the sodium chloride in the intestinal juices, into corrosive sublimate. Von Ziemssen gives calomel in three doses of gram. 0.5 in two hours and then obtains a number of thin grass- or moss-green calomel stools and considerable reduction of temperature, which often goes down to normal and remains there about twelve hours. These are the primary effects of the calomel. The secondary effects of the drug consist in modifying the intensity of the infectious condition, as has been shown by Liebermeister. The earlier calomel is given, the better,—best at all events within the first five days, and it should be used during the first week. Its action is very possibly a sterilizing one on the specific bacteria vegetating in the intestine. The abortive action of calomel, such as has been claimed by Wunderlich, has not been observed. Griesinger, Baumler and Weil have shown that neither the mortality is lessened nor the number of abortive cases increased by its use, and that no other properties belong to calomel than those of a mild non-irritating evacuant which reduces temperature. There is no question of mere eccoprotic action, since the effects upon the temperature and the local intestinal affection are observed in cases where active diarrhoea already exists. Attempts to fix the hypothetical specific action by long continued calomel treatment and to force a true abortive calomel treatment have at different times failed, as has also the sublimate treatment of typhoid fever.

Next to calomel, baths deserve the greatest consideration. Von Ziemssen first gives a warm bath to cleanse the skin and remove parasites. The temperature is then observed by bi-hourly rectal measurements for ten to twenty-four hours to determine its course. Lukewarm baths of 86° F. to 81.5° F. of fifteen minutes' duration, with continual stirring of the water and washing over the upper part of the body so far as it is not dipped in the water, are then commenced. The higher the temperature, the more severe the cerebral affection and muscular weakness and the intestinal

affection, so much cooler must the bath be. For several years Von Ziemssen has not given a bath below 63.5° F. The bath-tub is placed by the patient's bed with a screen around it and the patient is lifted into it. The water is renewed once only in twenty-four hours. In many cases, the bath is given only lukewarm, not under 75° F. during the whole course of the sickness, beginning at a temperature of 88.2° F. to 86° F. While the patient sits in the bath, the temperature is reduced to 75° F. or 72° F. by the addition of water to the foot and continual stirring. Such gradually cooled baths are especially recommended for patients of a weak, hyperæsthetic and nervous constitution, and especially for women and children. For young, robust and vigorous constitutions the simplest way is to use at once the cold bath of 63.5° F. to 65.5° F., as Vogl and his military colleagues do with their soldiers. It is in the highest degree important to vary the temperature of the bath according to the constitution of the patient, the stage of the disease, the time of day, the patient's temperature and the condition of the nervous system. In general terms, the following rules are to be observed: the earlier the stage, the higher the fever, the more robust the constitution, so much the colder should the water be; on the other hand the later the stage, the weaker the constitution, the more affected the nervous system, the warmer should be the water. Routine directions are bad in practice.

In regard to the frequency of the baths during the day and the time at which they are to be given, authorities are not in accord. Some bathe patients from ten to twelve times in 24 hours, others from two to four times only. Many prefer to give baths at night, others by day and night, and the majority of physicians only during the day. Von Ziemssen is in accord with Liebermeister in holding that baths have a better general effect when given during the normal temperature remission than during the period of exacerbation. Von Ziemssen thinks that three or four baths in the 24 hours are usually sufficient, though there are cases in which six to eight baths must be given. There are milder cases in which only one or two baths are necessary. Children should have less frequent and warmer baths than adults.

The duration of the bath should, as a rule, be not less than fifteen minutes, nor more than thirty minutes. The signal for its

termination should not be a mere sensation of chilliness, but actual shivering. Von Ziemssen thinks that other hydro-therapeutic measures which have been recommended as substitutes for douches and complete baths—as moist cold, the cold pack, sponging with cold water or with a mixture of water and vinegar—have generally no other value than that of a temporary refreshing of the patient, and are almost wholly without influence upon the temperature and the objective state of the nervous system. Spontaneous morning remissions are the signal for lessening the number of baths and increasing their temperature.

Von Ziemssen formerly used quinine in large doses as an internal antipyretic, but he has recently abandoned it wholly and uses antipyrine instead as being, in divided doses amounting in all to gram 5, much more certain and entirely free from the undesirable after-effects of quinine. The temperature falls from 2 to 4° C. and remains low for some time, certainly as long as after the administration of massive doses of quinine. The rubeoloid eruption frequently observed after its administration is of no significance. It may also be administered in clysters. Thallin, while exerting a distinct antipyretic effect, can not take the place of antipyrine. Antifebrin is also a valuable antipyretic, having in its favor the smallness of the dose, which is about one-fifth or one-fourth that of antipyrine, and its cheapness.

Management of individual symptoms and symptom excesses plays an important part in the treatment of typhoid fever. Cerebral symptoms, headache, oppression, vertigo, call for the prolonged use of ice bladders. In those patients to whom permanent cooling of the head is unpleasant, the subjective sensations must be taken into consideration. Sleeplessness, restlessness and tossing at night are best controlled by moderate doses of morphine. Very active delirium yields to the use of lukewarm or warm baths in the evening or early in the night. If these are not adequate, hypodermic injections of morphine should be employed. In graver cerebral troubles, cold baths and very cold douches are better.

Cardiac weakness is of most dangerous significance and demands prompt attention. In the treatment of this condition, camphor is preferred; one part of camphor dissolved in five parts of olive oil may be administered hypodermically, two to five

syringesful at a time. Of wines, Von Ziemssen prefers champagnes, and of concentrated alcoholic stimulants, he gives preference to cognac. The quantity to be given in twenty-four hours must be graduated according to the indications and the effects of the first doses. Too much is better than too little.

Bed-sores may be absolutely prevented by a large water matress. When they occur they should be dressed with boracic acid salve, zinc or lead plaster mulls and white lead plaster. The patient, even if lying on a water bed, should be turned on his sides for a few hours each day. Furuncles, circumscribed gangrene, etc., rarely or never occur under antipyretic treatment. Severe intestinal affection and excessive meteorism may be ascribed in the majority of cases to faulty diet or the frequent use of opium and tannin. Excessive meteorism is attended with great danger. For its relief, ice bladders to the abdomen or Priessnitz's pack are advised. Small doses of calomel as recommended by Friedreich, or naphthalin or turpentine in clysters. If the diarrhoea does not exceed four or five stools in the 24 hours, it demands no treatment. If it exceeds this, it may be treated by small clysters containing tincture of opium. If intestinal haemorrhage occur, every kind of food, all medicine, baths and every movement of the body are discontinued, ice bladders placed over the abdomen, and thirst quenched by small bits of ice. A syringeful of solution of sclerotic acid in water, one part to five, may be given every half hour as a styptic. In very profuse haemorrhage, threatening life, enemata of ice water are used. When the haemorrhage is very profuse and death from cardiac paralysis is threatened, injections of blood or salt water may be given. Bleeding during the period of late healing, fourth to sixth week, is more grave as regards prognosis than during the period of sloughing, in the second or third week, because in these cases, it is almost always due to delayed healing of the ulcers. Opium by the mouth and by the rectum in large doses is advised in cases of perforation, or injections of morphine may be used. Ice bladders should be placed over the abdomen and no food at all should be given. The thirst may be quenched by small pieces of ice, and every movement of the body avoided. Should sacculation of the perforation occur the sacculation should be opened and treated antiseptically. Puncture of the abdomen with a thin trocar to reduce the tension in the peritoneal cavity is only

of temporary benefit. Von Ziemssen does not refer to the surgical treatment of perforative peritonitis. The treatment of complications such as pneumonia, erysipelas, parotitis and otitis must be regulated by the accepted rules for the treatment of those processes. Prophylactic treatment consists in the use of antiseptic washes for the nose and mouth.

The care of convalescents from typhoid fever must be carried out with great strictness. The treatment of relapses is the same as that of the primary attack, but less energetic. A month or two after convalescence has been fully established the patient should be sent away to the mountains or a climatic resort, and where circumstances permit he should have complete rest for a year.

Nothnagel⁵⁹ considers the indications for the treatment of typhoid fever to be: 1. *Indicatio causalis.* 2. *Indicatio morbi.* 3. *Indicatio symptomatica.* As regards the first, nothing is to be said. The *indicatio morbi* would consist in having a remedy capable of destroying the bacillus of typhoid without destroying the individual. Nothnagel takes a decided stand as regards the treatment of the acute infectious diseases upon the point that we must search for causal remedies. In quinine we have had a specific remedy for malaria for the past two hundred years. We know that quinine renders the malarial poison innocuous without damaging the organism. If syphilis depends, as it seems to do, on an infection by bacilli, we know that mercury and iodine gradually destroy the syphilis bacillus without the organism being destroyed or damaged. The task of therapeutics as regards the acute infective diseases is to search for specific remedies; but as yet they have not been found. Calomel has been recommended by numberless authorities. If it is given as an abortifacient in typhoid, it must be given in the first week, when the diagnosis is as yet only probable. A milder course, not a cure, and a shortening of the disease are obtained, according to Weil. Nothnagel has not been able to convince himself that this is the fact. After comparative investigations, he has gained the impression that castor-oil acts exactly like calomel. Those observers who contend for the abortive action of calomel, hold that it becomes converted in the intestine into sublimate, and in this way acts upon the bacillus. But this has not been proved, and we cannot yet regard calomel as a specific.

When we come to consider the symptomatic treatment, the three indications that meet us, even in uncomplicated cases, are (1) the administration of a sufficient amount of nourishment; (2) the reduction of temperature; and (3) the keeping within bounds of abnormal secretions. We must give our patients sufficient food, and food in a fluid form to secure its digestion. Water takes the first rank among the foods. It is so much more necessary to give patients water when they are insensible, and do not themselves request it. It must be given regularly; every quarter of an hour some milk or water, or wine or the like must be given. The water must be good and pure, and is best boiled. Nothnagel warns against the use of aerated waters. Bouillon is not a food. If it is given at all it should be used only as a vehicle for real foods. Patients get daily from a litre to a litre and a half of pure boiled milk, which may be taken either warm or cold. If they object to pure milk, a little tea, or a few spoonfuls of brandy are added. Besides the milk, the yolks of from four to six eggs are given, and if soup is given the whites of eggs may be stirred up in it. Then the yolk of egg may be mixed with bouillon, chicken broth, pigeon broth, beef tea, veal broth, or gruels of oatmeal, rice, barley, etc. Such foods must be given at intervals of one half to two hours. The food is not changed until two or three days after defervescence is completed; then calves' brains, or sweet breads may be given, cocoa, or chocolate with egg, and biscuit. Six days after the subsidence of fever, meat may be given,—if the exhaustion is very great, a little earlier than this. It must be carefully prepared, raw or scraped, with salt added to it. A coffee-spoonful at a time. The slight rise in temperature that follows the first administration of meat is usually not important.

A very important point in the treatment consists in the administration of alcohol, which acts in the acute febrile diseases as a preventer of waste, the alcohol itself undergoing oxidation more readily than the bodily material, therefore being burnt up in the organism whilst the bodily tissues are spared. In this way it acts directly as a food for the preservation of the organism. Nevertheless, Nothnagel is decidedly opposed to the promiscuous exhibition of alcohol without discrimination in acute febrile diseases. It is further useful as a cardiac stimulant. In typhoid fever where we have a long-continued febrile process, it is requisite and neces-

sary to give wine in all cases, without exception, from the first. The quantities that may be administered are enormous, delicate ladies not accustomed to wine having taken in a day a whole bottle of wine containing three-fourths of a litre, of which 10 per cent. is alcohol, ten to sixteen coffeespoonfuls of brandy and some beer.

In regard to the second indication, the combating of the fever, the views that are held by the majority of German physicians on the treatment of typhoid fever may be summed up as follows:—

A decided antipyresis is necessary in hyperpyrexia. It is unconditionally demanded in typhoid when morning and evening temperatures keep above 40° C., that is to say 104° F., and when decided nervous symptoms are present. So long as the patients have a clear mind and a morning temperature of 39° C. with a distinct pulse, antipyresis is not unconditionally demanded.

Antipyretics may be divided into two great groups: the chemical antipyretics,—those which reduce temperature by a chemical action; and hydrotherapeutic measures,—those which reduce temperature by the abstraction of heat. Formerly quinine was the only known chemical antipyretic. In the last few years, after a number of these drugs have been tried and abandoned, we have become acquainted with thallin, antipyrine and antifebrin. All these remedies are capable of reducing temperature in a remarkable manner. When a crisis arrives in an acute febrile affection, it runs its course in the great majority of cases without injurious complications: the temperature falls, the pulse slows and the patient feels well as the disease comes to an end. But there are cases in which the crisis takes place with injurious and dangerous accompaniments: symptoms of collapse comes on, the temperature and pulse fall to below normal, and the pulse rate becomes arhythmic. Cerebral symptoms make their appearance and are dependent upon anaemia of the brain: these are designated the delirium of inanition, and the coma of inanition. Such antipyretics as resorcin and kairin reduce the temperature energetically, but are followed by unfavorable symptoms. But the three new antipyretics above mentioned only rarely give rise to unfavorable symptoms. Nothnagel thinks that the three are of equal value, but has a certain paternal predilection for thallin. No one method of antipyresis is the most applicable. We must individualize our cases. If we would abstract heat in a case of typhoid, various methods are

at command,—baths, packs and sponging. Packs are employed mostly in the case of children. The baths, however, constitute the principal method, and are sometimes administered warm and sometimes cold. The cold baths are given at a temperature of 22.5° C.,—that is 73° F. The patient is left in such a bath from three to seven minutes. In the case of weak persons, a little wine must be administered before and just after the baths, and hot water must afterwards be put to their feet. When the patient begins to shiver, he must be taken out. When he can not bear such a low temperature he must be put in a warmer bath, the temperature of which is gradually lowered. The warm baths are administered at a temperature of 86° to 90° F., and the patient is allowed to stay in longer, and if unpleasant effects do not occur, as long as a half an hour, or exceptionally one or even two hours. Nothnagel employs cold baths when the case is one of typhoid in the first two weeks, or even in the commencement of the third, in the case of a strong patient who is not too far reduced, who has no cardiac enfeeblement and generally speaking no complication. He employs lukewarm baths in the second half of the third week, and later still when the patient is weak. When there is cardiac feebleness along with fever, and especially when profuse diarrhoea is present, cold baths should not be given.

Ernest Brand,⁶⁰ of Stettin, published an elaborate series of controversial articles in defense of his method of cold-water treatment of typhoid fever. This work is characterized by exuberance of detail and refinement of analysis. The main argument is, however, very simple and in view of the results claimed by the author and established by official reports of the German Government as regards the military service, very important. Brand states that the dissertation owes its origin to articles published within the last few years by Gläser, Ebstein and Senator, attacking the method and claiming equally good results from expectant and modified expectant methods of treatment. The author claims that the expectant method of the present is in no respect different from that of former periods, and aside from the occasional employment of internal antipyretics, its means are the same. Under the expectant method the death-rate according to Liebermeister is 27.3 per cent.; according to Griesenger, 18.9 per cent.; in Kiel, 15.6 per cent.; in Leipzig, 18.5 per cent.; in the Vienna Hospitals, over 20 per cent.;

in Dresden, 13 per cent.; in Strasbourg, 23 per cent.; in Paris, 32 per cent., and during the siege of 1870-71, 60.8 per cent. According to Gläser, the mortality in recent times under an expectant treatment, as well as under the so-called antipyretic treatment, that is to say, with and without medicine, has been reduced to between 7 per cent. and 8 per cent., and quite recently under a purely expectant treatment to 3 per cent.; and according to Ebstein, again, under an expectant management, the mortality has fallen to 5.5 per cent. Brand avers that the favorable statistics of these observers are based upon a concurrence of fortunate circumstances, among which is the unusually favorable characters of the disease in the cases observed. He asserts that what these gentlemen have chosen to designate as the cold-water treatment is in fact not the cold-water treatment as he has practiced and taught it; and he points out the differences between the effects of the cold-water treatment and the treatment itself according to his method and the antipyretic methods in contrasted double columns as follow:—

**COLD-WATER TREATMENT.
[BRAND'S METHOD.]**

1. Severe typhoid will in all its stages be changed to mild; mild typhoid to a still milder form.
2. That happens: *A.* Through the prevention of any rise of temperature and the control of the temperature within a range scarcely exceeding the normal.
B. Through preventing disturbances of normal function.
C. Through limiting the depressing and febrile process.
D. Through the prevention of complications.
3. Every third hour a bath, 15° R., fifteen minutes' duration as long as the temperature rises above 39° C. cold affusions, precise and good alimentation.
4. The treatment is directed against the process as an entirety.
5. Baths alone are administered.

**THE ANTI PYRETIC
METHOD.**

1. Changing to an afebrile disease without regard to disturbances of function.
2. *A.* Through the prevention of excessively high temperatures.
B. Through converting a continued or sub-continued fever to a remittent type.
3. Formerly. Baths when the body temperature rises to 40° C. every second evening, and then some antipyretic drug.
At present. In the evening an internal antipyretic, and during the night baths frequently repeated until the temperature falls to normal. During the day no treatment whatever, or at least only when the temperature rises to extreme high levels; then a bath.
4. Here, only against the symptom of extra high temperature.
5. Baths and internal antipyretics.

6. Mortality:

When the treatment is begun at the right time, and carried out according to rule, it will be nil.

In family practice, . . . 1 per cent.

In consultation practice, . . . 3-4 per cent.

In military practice, . . . 4 per cent.

In hospital practice, . . . 5 per cent.

Without great fluctuation.

6. Formerly an average mortality of from 7 per cent. to 8 per cent.; ranging between 0 and 23 per cent.

At present, 10 to 18 per cent., with remarkable oscillations.

He claims that Gläser and his followers are wrong in that (a) they have confused a faulty antipyretic method with the true cold-water treatment; (b) that they have attacked the cold-water treatment and pronounced an unfavorable judgment upon it without having understood it; (c) that they ascribe to the expectant treatment results that in fact it does not possess.

He then sets out to give the points of his cold-water treatment, and to show the medical world that it is something entirely different from what the professors of Berlin, Göttingen and Hamburg think; and he quotes from the statistics of the Prussian Army reports from April 1, 1879 to March 31, 1881: "With reference to the treatment of typhoid fever, the cold-water treatment of Brand is very generally used in the army, with the exception of some few small hospitals, whose mortality is not of sufficient importance to modify the general result. The mortality from typhoid fever from 1820 to 1844 was 25.8 per cent. From 1868 to 1874, with the exception of the years of actual field service, 15 per cent."

In the year 1874 were treated 2735 cases with 329 deaths=12 per cent.
" " 1875 " " 3620 " " 408 " =10.9 "
" " 1876 " " 2747 " " 298 " =10.8 "
" " 1877 " " 2081 " " 206 " = 9.8 "
" " 1878 " " 2112 " " 190 " = 8.9 "
" " 1879 " " 1741 " " 163 " = 9.4 "
" " 1880 " " 2534 " " 226 " = 8.9 "

Brand cites cases showing that in the employment of the systematic treatment by cold water, complications need not cause anxiety; that properly administered, it is in heart weakness, as is also especially true in pneumonia, a sovereign remedy; that in pregnancy, in order to save the life of the child, it must be employed from the beginning; that in the severest conditions it affords measures of assistance to the physician not to be found in the shops of the apothecaries; and that neither poverty nor the circumstances

even of country life render its employment impossible; and in recapitulation, he formulates the following as the results of the systematic cold-water treatment according to his directions:—

(1) Not only the possibility of preventing every single exacerbation of fever, but also the absolute control of the fever by acting upon its cause. (2) The prevention of disturbance of function on the part of the brain, the heart, the lungs, the kidneys and the skin. (3) The prevention of catarrh of the digestive tract and the possibility of an abundant alimentation. (4) The prevention of the progress of the infiltration of the intestinal glands to ulceration in those cases which are thus treated from the beginning. (5) The prevention of complications in cases thus treated from the beginning, and the lessening of the number of complications in those which are submitted to the treatment at later periods. Altogether, there remains of the ordinary picture of typhoid fever under the Brand cold-water treatment nothing more than (a) a mild fever, (b) an unimportant bronchial catarrh, (c) an enlargement of the spleen, (d) the rose rash, (e) the infiltration of the intestinal glands. Everything else is prevented, and what might have been the severest case runs its course as a mild one when the patients are sufficiently early brought under treatment. The exceptions to this statement occur only when complications develop at the onset.

Bouchard's⁶¹ treatment of enteric fever comprises four principal points: general antisepsis, intestinal antisepsis, antipyresis and alimentation. As soon as the diagnosis is made, he prescribes (1) a purgative which shall be repeated methodically every third day. For this purpose he uses fifteen grams of sulphate of magnesia. (2) Forty centigrams of calomel daily in twenty doses of two centigrams each,—one every hour for four consecutive days. This medication is intended to meet the indication of general antisepsis. (3) Intestinal antisepsis is obtained by the administration of a magma of 100 grams of powdered vegetable charcoal, 1 gram of iodoform, 5 grams of naphthalin. This is mixed with 200 grams of glycerine and 50 grams of peptone. This mixture forms a black semi-liquid magma which is to be taken in the course of twenty-four hours, in doses of a teaspoonful every two hours in water. Morning and evening the large intestine is washed out by an enema of one part of carbolic acid to one thousand of water. (4) From

the first day the patient has eight baths daily until the cure is complete, that is to say until the oscillations of temperature do not extend below 37° C. or above 38° C. (5) Quinine is reserved for those cases in which, despite the baths, the temperature remains high. The doses are 2 grams during the first two weeks, 1½ grams during the third week, and 1 gram during the fourth and fifth weeks. These doses are administered *a coup*, 50 centigrams every half hour. When the full quantity has been given the dose is not repeated until after an interval of 72 hours. The indication for the use of quinine is the rectal temperature of 40° C. in the morning, or of 41° C. in the evening. (6) The aliment consists of soup with barley and given in amounts of from 1½ to 2 litres in the course of 24 hours,—the glycerine and peptones in the above mixture and lemonade with wine.

Grancher⁶² gives the following directions for the treatment of typhoid fever in children. In the beginning a purgative may be given and repeated if necessary every third day. Twice a day antiseptic enemata, consisting of 500 grams of water and 5 or 10 grams of borate of sodium. If the tongue becomes dry, a simplified intestinal antisepsis of 2 to 4 grams of salicylate of bismuth associated, if there be constipation, with 2 grams of calcined magnesia, and 1.5 to 2 litres of fluid in the twenty-four hours. Bouillon, barley water, lemonade, milk, and, if there be much prostration, alcohol and extract of bark. For the relief of excessive pulmonary congestion, leeches may be applied to the sides of the thorax or flying blisters suffered to remain only a very short time. In the case of persistent high temperature or excessive agitation, cold sponging or lukewarm baths are to be employed. Cerebral symptoms may be treated by leeches applied to the mastoid region. The most important point of the treatment, however, is the systematic employment of quinine in massive doses, not only as an antipyretic, but as an antiseptic. Grancher entertains the view that the temperature, to some extent at least, is an indication of the intensity of the microbic infection. When the thermometer reaches 39.5° C. or 40° C., or above that, there should be administered, according to the age of the child, 50 centigrams to 2 grams of quinine. The quinine is to be administered at about five or six o'clock in the afternoon in doses of 60 centigrams every half hour in order that the beneficial effects may

be experienced during the course of the night. It is remarkable that these doses are followed by sleep. The following day the child awakes with a marked amelioration, sometimes so considerable as to astonish those who behold it.

Dr. Baelz, corresponding editor of the ANNUAL, writes that cold-water treatment was used in 94 cases of typhoid fever and 30 cases of typhus in the Osaka (Japan) hospital for infectious diseases. Result: of the typhoid fever patients, 80 recovered, 14 died; of the 30 typhus patients, 22 recovered, 8 died.

Asta-Buruga⁶³ reported the treatment of 45 cases of typhoid fever in the Roosevelt Hospital in New York. The treatment was mainly expectant. Equal parts of milk and lime-water constituted the sole diet as long as the fever lasted. Forty grains of subnitrate of bismuth and pepsin, divided into four doses, were given in the milk daily. Whisky was used as a stimulant as occasion required. When convalescent the patients were allowed solid food, commencing with a tenderloin steak, ten or twelve days after the subsidence of the fever, and were generally allowed to sit up about five days later. When the fever was protracted, small doses of Fowler's solution were given, apparently with benefit. Antipyretics were administered in several cases. Antipyrine, antifebrin, the cold pack, the cold bath and the abdominal water coil were used. The mortality was 8.88 per cent.

Vincent⁶⁴ treated three pregnant women suffering with typhoid fever with cold baths, after the method of Brand, with the result of preventing abortion and curing all three. Sokoloff⁶⁵ treated twenty-three cases of enteric fever by the inhalation of cold air, with favorable results.

Randot⁶⁶ having made a careful clinical study of the effects of treatment of typhoid fever with small doses of corrosive sublimate, formulates the following conclusions: (1) Corrosive sublimate is useful in typhoid fever, employed in minute doses, that is to say in daily doses of gram .002 to .005. (2) Administered in an alcoholic potion, it has seemed to diminish the duration and intensity of the febrile process without attendant disadvantages. (3) The prescription of solutions of one-half to one-third the strength required to destroy the bacillus of Eberth, very probably permits us to neutralize in the blood the secondary intoxicants of microbic origin. In other words, this treatment seems to address itself

especially to the products of the infectious organisms without being able to destroy or sterilize those organisms themselves. (4) It would be reasonable, in order to obtain a direct concurrent anti-septic action in the intestine, to employ a less soluble microbicide, like naphthol for example. (5) This treatment in no way hinders us from meeting by appropriate medication the symptomatic indications which present themselves in the course of the disease.

Haas⁶⁷ considers that antipyrine exceeds in usefulness according to his experience all medicaments thus far employed in the treatment of typhoid fever, and especially does it exceed quinine. Its action brings about: (1) Decided reduction of the fever temperature of the body. (2) It controls delirium, and favorably influences all the nervous phenomena of the sickness. (3) There appears to be a favorable diminution of the enlarged spleen coincident with the falling temperature. (4) Unfavorable results were not observed. All the patients entered upon early and favorable convalescence. (5) Only exceptionally was the antipyrine badly borne.

Francis Minot⁶⁸ presented observations on the treatment of typhoid fever with antipyrine and thallin, based upon the observation of twenty-four cases in the Massachusetts General Hospital, the object of the study being to ascertain the proper doses of the drugs, the general and specific effects upon the patient, the result from continued doses as compared with its occasional employment, any unfavorable results, and the general effect of antipyrine and thallin upon the course of the disease.

The following conclusions were reached: (1) Both antipyrine and thallin have a remarkable power of reducing the temperature in typhoid fever. (2) In no case was the use of these refrigerants apparently followed by any unfavorable effect upon the course of the disease. (3) The general condition of the patient was more comfortable after taking antipyrine and thallin, which were often followed by sleep. (4) The refrigerant medication by antipyrine and thallin appears to have no specific or decided effect upon the course or issue of typhoid fever. It often contributes much to the patient's comfort, perhaps indirectly promotes his safety. (5) The effect of antipyrine and thallin in promptly lowering the temperature shows that the danger in typhoid fever does not consist in high temperature alone, and that the latter is rather an index of

the violence of the abnormal condition which we call fever, though perhaps adding somewhat to the danger. (6) By the internal use of antipyrine and thallin, all the effects which are claimed for the treatment of typhoid fever by the cold bath are readily obtained without the trouble and inconvenience of the latter method, and without exposing the patient to the dangers of exhaustion and shock consequent on the fatigue of removal from bed. (7) These remedies may be given without danger to the youngest patient in suitable doses; and, indeed, their beneficial effects are more decided and the unfavorable consequences are less observable than with adults.

Fuerbringer⁶⁹ and Leyden assert, contrary to the experience of Goetze and Rossbach, that antipyrine has no action whatever upon the course of typhoid fever. The experiments of Fuerbringer go to show that calomel probably neutralizes the toxic products of the bacillus, but in point of fact this action has not as yet been positively demonstrated. Leyden holds the opinion that mercury, properly administered, diminishes to some extent at least the intensity of the action of the virus. Thorner has used calomel with some success. Baginsky regards resorcin, and perhaps calomel also, as possessing some action in modifying the intestinal fermentation. Kaliszcher is one of those who regard calomel as a precious medicament in the early periods of typhoid.

Berezovsky⁷⁰ has carried out a series of observations concerning the action of antifebrin in febrile patients, mainly in those suffering from enteric fever. The outcome of his experiments is this: (1) Even small doses—four-grains—produce a marked fall of febrile temperature (0.9° to 2.0° C. in an hour after the administration). (2) The duration of action of the drug is different in different types of fever: it is relatively shorter ($1\frac{1}{2}$ to 3 hours) in the case of febris continua; it is longer in remittent fever. The latter may be suppressed comparatively easily; the normal temperature may be kept up by giving four-grain doses every two hours. However, the fever returns immediately after discontinuing the drug. (3) Antifebrin reduces the frequency of the pulse from 8 to 22 beats a minute. (4) The blood-pressure—as measured in the radial artery by means of Basch's sphygmomanometer, an aneroid variety—markedly rises after a dose of antifebrin. The same result is obtained on measuring the arterial

tension by means of Filipovitch's palpometer. (5) The amount of urea decreases with the fall of temperature. (6) Patients take antifebrin readily. The drug markedly improves appetite and does not give rise to any unpleasant symptoms, such as vomiting, etc.

Leclerc⁷¹ found as a result of blood-counting in typhoid patients subjected to treatment by the cold bath, by antipyrin and by acetanilide, that while the cold bath and antipyrin were not followed by deglobulization, the administration of large doses of acetanalide for some time was followed by a notable reduction in the number of red corpuscles.

Kesteven⁷² treated a series of cases of typhoid fever with oil of eucalyptus in doses of from five to ten minims. In a disease like typhoid fever where distinct local lesions exist in Peyer's patches, the immediate application of the remedy is, he thinks, practicable. He believes eucalyptus to be a specific remedy and would recommend a very thorough trial of it, not only in cases of typhoid fever, but in all zymotic diseases. Reese⁷² relates a satisfactory experience in the treatment of typhoid fever with the phosphates, particularly those of calcium, iron and sodium. These salts are administered together with cinchona alkaloids and aromatics. The treatment is begun with mercurial and saline purging. The purging is repeated every week. Curnow⁷³ advocates the administration of enormous doses of spirits, twelve to sixteen or twenty ounces or more of brandy in the course of twenty-four hours in connection with wet packing.

TYPHO-MALARIAL FEVER.

Nosology.—Dr. J. Levi,⁷⁴ our Corresponding Editor for the Virgin Islands, British West India, states that he has never encountered the hybrid fever to which the term typho-malarial has been applied, and thinks that it is quite time that this compound term should be dropped.

Pathology.—J. Edward Squire⁷⁵ read a paper on typho-malarial fever, which term he used to designate a malarial fever which has assumed an adynamic type, such as is presented in enteric fever,—the form he had observed among the troops around Suakin during the campaign of the previous year. Dr. Squire realized that there were two diseases, however, present, both possessing similar symptoms, which led to their being diagnosticated

as enteric fever. Post-mortem examination showed the diagnosis to be correct for some of the cases, but in others, similar as to symptoms. The absence of the enteric lesions which were expected to be present, proved that these latter were not in reality cases of enteric fever.

The term typho-malarial fever has been applied to several conditions essentially different. The College of Physicians, following the opinion expressed at the International Medical Congress at Philadelphia in 1876, places the name as a subdivision of enteric fever, and describes it as a combination of malarial and enteric fevers; in other words, a compound fever resulting from the simultaneous action of two distinct poisons. A somewhat similar view was upheld in 1861 before the Epidemiological Society of London by Dr. Russell, who goes so far as to speak of typho-malarial fever as an example of the parallelogram of forces, it being, as he considers, the resultant of the two poisons of malarial and of enteric fever; while Dr. Woodward, who gave us the name, considered it a hybrid between these two diseases. Dr. Squire protests against these views, and gives preference to the opinion that typho-malarial fever is not the result of the typhoid fever poison, but a form of malarial fever; and he defines typho-malarial fever to be "the expression of the malarial poison, or of malarial fever in which intestinal and adynamic symptoms are prominent, causing the illness to simulate enteric fever." The College of Physicians, in saying that typho-malarial fever is a combination of typhoid and malarial fever, probably intends to signify that one is modified by the other, and not that two distinct diseases [a hybrid in fact] are produced, as would be suggested by Dr. Russell's simile of the parallelogram of forces. The belief in hybrid diseases should be passed forever. A specific poison produces a specific disease with certain pathological results; but the symptoms may be modified by a variety of causes within and external to the patient; or two poisons may enter the system together, and one may then delay or modify the manifestations of the other; but no new disease is thereby produced. If the term typho-malarial fever presents nothing to men's minds beyond a modified typhoid enteric fever, a hybrid disease, it is not worthy of a place in our nosology. But if a poison absolutely distinct from that which produces enteric fever and with different pathological manifestations, may under certain conditions

cause symptoms closely resembling those of enteric fever, and an illness often mistaken for this disease, then we have a morbid state of much interest and of great importance, and one which has claims to special recognition. This would appear to be the case with regard to the disease now under consideration. The term typho-malarial fever having at length been included in our nomenclature, should remain, and should be transferred from its present position under enteric fever and placed as a subdivision of malarial fever. The pathological signs rather than the symptoms serve to show the difference between typho-malarial and enteric fever, and where the necropsies disclose the Peyerian ulcers of typhoid enteric fever, the latter disease is indicated.

Dr. Squire's experience at Suakin shows that besides cases of true enteric fever, verified by post-mortem, there were other cases diagnosed as such in which the necropsy showed absence of ulceration in Peyer's patches even after three weeks' illness, and only general congestion of the intestinal mucous membrane.

The course of that form of malarial fever which it has pleased Dr. Squire with others to designate as typho-malarial fever, is thus described: Tonsillitis may occur as a prominent sign. The onset is sometimes more sudden than that of enteric fever and bilious vomiting is often an early and persistent symptom. Diarrhoea is frequent, but not invariable. When present the stools are greenish, or resemble the stools of enteric fever. Congestion may extend the whole length of the alimentary canal, causing a nasal catarrh and symptoms resembling dysentery. Later on, the tongue becomes dry and brown and sordes appear. Mental apathy gives place to low, muttering delirium with subsultus and other signs of the typhoid condition, and death may result from exhaustion; or prolonged convalescence keeps the patient in the hospital for weeks or months before the absence of diarrhoea and evening fever allows of his discharge.

The temperature, although often resembling that of enteric fever, reaches a high point earlier in the illness, and the daily range is greater. The absence of rose-spots is invariable. The symptoms being so similar to those of enteric fever, we must turn to the pathology to show the great distinction between the two, their differentiation being of importance from the differences in etiology. Speaking generally, the difference is that whereas cell

proliferation and subsequent ulceration in Peyer's patches and the solitary glands of the ileum are the pathological signs of enteric fever, such ulceration is rarely, if ever, found after death from typho-malarial fever. As in other malarial fevers, ulceration may be found in the intestines in typho-malarial, but it does not select and is not confined to Peyer's patches and the solitary follicles. These ulcers may be found in any part of the alimentary canal, and may be of any shape and of almost any size. The other pathological signs are those of malarial fevers: congestion and ecchymosis of the intestinal mucous membrane, especially in the duodenum and upper jejunum, enlargement of the spleen and of the mesenteric glands, and congestion of the liver. Among the complications met with, hæmorrhage from the bowels, urinary organs, and other parts is not uncommon. Pulmonary congestion or pneumonia may occur. Jaundice may be present. Purpuric blotches, without scurvy, were seen in some of the cases at Snakim. Rheumatism, sometimes with effusion into the joints, has been observed. Typho-malarial fever may occur wherever malaria is found; imperfect sanitation or the prevalence of enteric fever may determine the intestinal symptoms. Oversatigue and excitement are predisposing causes. Typho-malarial fever is not communicable from person to person. It is probable that the fever of Gibraltar, Malta, and the Mediterranean may sometimes be of the nature of typho-malarial fever. Dr. Squire proposes that the term should be restricted to malarial fevers which, in their symptoms, closely simulate enteric fever, and that those cases should be excluded which are found post-mortem to have the pathological appearances of enteric fever.

J. W. Penn,⁷⁶ having encountered numerous cases of typhlitis and perityphlitis accompanied by a protracted form of fever presenting many of the characteristics of so-called typho-malarial fever, was led to conclude that a milder degree of irritation in that locality might give rise to a symptomatic fever corresponding to so-called typho-malarial fever.

TYPHOID, OR ENTERIC, FEVER.

(From the ANNUAL for 1889.)

Etiology.—The evidence grows, year by year, stronger of the specific causation of enteric fever,—*i.e.*, the dependence of the disease upon a vegetable micro-organism that causes enteric fever alone, is demonstrable in the tissues of the victim, is capable of reproduction upon artificial culture-media, and, when inoculated into animals, produces symptoms comparable to those of the original disease, again with the presence of the organisms in the tissues. From this point of view the disease cannot be admitted to arise *de novo*, but every case must be secondary, directly or indirectly, to some pre-existing case.

The disease does not appear to be contagious in the ordinary sense of the word,—that is, it is not transmissible from person to person by contact, immediate or mediate. The conveyance no doubt takes place most commonly through the intermediation of water used for drinking or for culinary or other domestic purposes, and contaminated by the discharges from one suffering with the disease. Thus, milk adulterated with such water or received into vessels rinsed therewith may act as a carrier; so, too, may vegetables sprinkled with defiled water. Further, it is conceivable that dried typhoid excreta may be ground to powder, disseminated through the air as dust and inspired, and thus bring about the disease. Of course, direct infection may take place through the soiled hands of attendants and laundresses and the like. It has not always been possible to identify the bacillus of enteric fever in water which there was strong reason for believing to be the carrier of infection, as the organism is rather a sensitive one and may have disappeared before the examination is undertaken.

Instances are numerous and convincing in which improvement or change in the water-supply, in conjunction with the institution of appropriate and efficient drainage, has been followed by diminution in the prevalence of, and mortality from, enteric fever. Of the many complications of enteric fever, it is probable that some are dependent upon localization of the typhoid bacillus, while others are, no doubt, due to secondary infection.

Péter ¹⁰⁰_{ss.s} states that, more than twenty-five years ago, he saw an examiner, a pupil of Andral, pluck a student for having said that typhoid fever might be contagious. But the times have

changed, and a student who said the contrary would now be rejected. The physicians of the present may be divided into three groups: those who believe in the spontaneous origin of the infecting principle of enteric fever, those who believe in its contagiousness, and those who hold to both these views. Péter declares himself to belong to the last. The contagionists may be subdivided into those who believe only in contamination by typhoid material and those who think that contamination may arise from any kind of faecal material whatever. Péter inclines to the latter view.

Picot⁷⁰ made use of the opportunity afforded by the recent epidemic at Bordeaux to deliver a series of lectures upon enteric fever. This epidemic arose in the last week of November, 1887, and prevailed extensively for some months; it was due to contamination of the water supply. He reviewed in an admirable manner the present state of science in regard to the nature of the disease, and particularly in regard to the researches, which have clearly established its bacterial origin. The concluding lectures of the course point out the direct application of this knowledge to prophylaxis and therapeutics.

Mosny¹⁴⁶ called attention to the remarkable diminution in the prevalence of enteric fever in Vienna, and expressed the opinion that the change in the water supply has been the cause of this fortunate change. Since 1874, the city, formerly only supplied by water from wells or from the Danube, has derived its water from the sources of the Kaiserbrunnen and the Stixenstein, which give each day about one hundred and seventy litres per capita. The death-rate of typhoid fever, which had in 1859 already considerably diminished to 1.2 per thousand in place of two per thousand, a result of the consideration of sewers, fell in 1874 to 0.11 per thousand, as a result of the distribution of spring-water. Many houses were still at this time supplied with well-water. In these houses the proportion was 3.02 per hundred, while in those supplied with spring-water it was only 1.26 per hundred. (I presume that these latter figures refer to the prevalence of the disease, and not to its mortality.)

A final and conclusive proof is furnished by the epidemic in 1877, which followed the partial substitution of the waters of the Danube for spring-water in certain quarters. The epidemic was

localized in the districts provided with the Danube water. The number of patients in this quarter was 21.5, while in those provided with the water from the springs it was 3.8. From this it is to be concluded that water is a principal agent for the transmission of typhoid fever, and that in order to protect the city it is necessary to supply the population with a sufficient quantity of water of incontestable quality.

Roux²⁴³ found the presence of typhoid fever at the garrison of Angoulême, which had only been free from the disease one month in ten years, namely, November, 1884, and which periodically has broken out in frightful epidemics, to be due to pollution of the drinking-water. Pouchet¹⁴⁶ analyzed the water supply of a group of houses at Joigny, in which typhoid fever had prevailed in the form of an epidemic, described by Longbois. He found the waters much defiled with organic refuse. Culture experiments showed a variety of bacteria, but no bacillus typhosus. Martin¹⁸⁸ showed incontestably that the epidemic at Bordeaux in 1887 was due to the contamination of one of the sources of the water supply. He demanded, as a measure of prudence, that the water derived from the district referred to be no longer distributed. This having been carried into effect, there was a rapid abatement in the intensity of the epidemic. He emphasizes the fact that the greater number of local epidemics in the neighboring villages were due to disease transported thither by individuals from Bordeaux.

Bondet²¹¹ found that an epidemic which prevailed in the hamlet of Sous-Ville Charmoux was due to defiled drinking-water. Culture experiments revealed the presence of the bacillus typhosus. The epidemic which prevailed in Cincinnati during the months of September, October, and November, 1887, was mild and attended by a comparatively low death-rate. A writer in the *Journal of the American Medical Association* attributes it in part to the drinking-water, which is obtained from the Ohio River at a point near the eastern extremity of the city. Above this point there are several sewers emptying their contents into the river, which was lower that season than for several previous years; also in part to a very extensive tearing up of the streets and turning up of soil for the purpose of municipal improvements. A good many cases occurred in families who derived their water supplies from wells. Gibert²⁰³ ascribes an extensive epidemic at Havre in 1887 to eman-

tions from the soil transmitted by means of the atmosphere. Yersin¹⁹⁷ likewise ascribes an epidemic which prevailed at Meiringen in 1880, and which he carefully investigated, to emanations from the soil, which had been excavated for the building of an aqueduct.

A striking illustration of the origin and spread of typhoid fever is the epidemic that played havoc in a German artillery barracks²² during more than a decennium, from 1873 to 1885. Almost the whole of the one hundred and forty-six cases occurred in one of two barracks, in which two hundred and thirty-eight men found accommodation, although the drinking-water of both was from a common source. Every inquiry being fruitless of results, the question of the propriety of closing the barracks came up for consideration, when suspicion fell upon the bed-linen and clothing. It was then discovered that three of the recent cases had used the clothing of men that had been attacked, and that the linings of the trousers were almost without exception soiled by dried faecal matter, of which a part probably had its origin in typhoid patients. The clothing had previously gone through a routine of disinfection by sulphur vapor, but, as the result showed the disinfection had been *nil*, it was now submitted to thorough cleansing, twelve hours saturation with chlorine gas, and, lastly, dry heat for several more hours. From this time, November 18, 1885, no more cases of disease occurred.

Salle²³ attributes an epidemic of typhoid fever which made its appearance in the Garrison St. Paul, of Verdun, in the spring of 1885, to the accumulation of filthy material underneath the floors.

In a report on the epidemic of typhoid fever which appeared at the Dupleix barracks and in the surrounding streets, Collin¹⁹¹ thought that it merely resulted from the insalubrity of this particular quarter of Paris. He accounted for its appearance in the barracks by the arrival of a regiment of recruits from the provinces, who by their youth, and the fact that they were not acclimated to Paris, were particularly exposed to contract typhoid fever, from which Paris is never free. The regiment being sent to Saint Germain, only two cases of typhoid fever were recorded during the following fifteen days.

Féréol¹⁰⁷ reported a local outbreak of typhoid fever at Eaux-Bonnes, a landlord's three children suffering with typhoid fever after a traveler had been sick in the hotel with the same disease.

No contamination of the water was found, but these children slept in a bedroom into which odors from the cesspool found their way.

Fitz, of Boston, ⁹⁹ made a critical investigation of eleven cases of typhoid fever, of which seven probably, and four possibly, originated in the Massachusetts General Hospital in the course of six years. While the evidence of infection within the hospital is in none of these cases absolutely conclusive, Fitz and his colleagues suggest special directions which are worthy of general adoption, not only in hospitals, but, as far as possible, in private practice: 1. Mattresses and pillows (when liable to become soiled) are to be protected by close-fitting rubber covers. 2. Bed and body linen are to be changed daily. Bed-spreads, blankets, rubber sheets, and rubber covers are to be changed at once when soiled. Avoid shaking any of these articles. 3. All changed linen, bath-towels, rubber sheets and covers are to be immediately wrapped in a sheet soaked in carbolic acid (one to forty). Remove to the rinse-house as soon as possible, and soak six hours in carbolic acid (one to forty). Then boil the linen for a half hour, and wash with soft soap. The rubber sheets and covers are to be rinsed in cold water, dried, and aired for eight hours. The bed-spreads and blankets are to be aired eight hours daily. 4. Feeding utensils, immediately after being used, are to be thoroughly cleansed in boiling water. 5. Dejections are to be received into a bed-pan containing half a pint of carbolic acid (one to twenty). The nates are to be cleansed with paper and afterward with a compress-cloth wet with carbolic acid (one to forty). 6. The bed-pan and cloths are to be carried to the tower. Add two quarts of carbolic acid (one to twenty) in divided portions to the contents of the bed-pan; mix thoroughly by shaking, and throw the liquid into the hopper. The bed-pan and hopper are to be cleansed with carbolic acid (one to twenty) and wiped dry. The cloth used for the above purpose is to be at once burned. 7. The corpse is to be covered with a sheet wet with carbolic acid (one to forty). 8. After the discharge of the patient from the hospital, the mattresses are to be thoroughly beaten and aired every day for a week. The bedstead is to be washed with corrosive sublimate (one to one thousand). 9. These directions are to be followed until the patient is free from fever.

Vaughan and Novy ⁹ investigated drinking-water used by families in which enteric fever had occurred during an epidemic at

Iron Mountain, Michigan, with a view to ascertaining whether or not poisons would be developed by the bacteria which were suspected of being present in the water. Sterilized meat preparations and sterilized milk were inoculated with the suspected water. Control experiments were made with Lansing water. A syrupy residue was obtained, which contained poisonous ptomaines, produced by the micro-organisms present in the Iron Mountain water. This ptomaine, injected in large doses beneath the skin of cats, produced primary depression of temperature followed by an elevation of temperature. These observers do not regard the substance which they obtained as identical with the typhotoxine of Brieger. The presence of the bacillus typhosus in the Iron Mountain water was demonstrated by potato culture and by microscopical examination. Vilchur, of St. Petersburg, ^{Jan. 14} from experiments with typhoid stools, found that all the bacilli, however numerous, were invariably destroyed by the addition of a volume of boiling water equal to four times that of the stool. In this way, he suggests, it will be easy to disinfect with certainty all the dejections of typhoid patients. Holmes ¹¹⁵ _{Sept.} read a paper on secondary mixed infection in typhoid fever, showing the way in which the inflammation of the lymph-glands, caused by the irritation of the typhoid bacillus and its ptomaine, diminishes their resistance to pathogenic and other bacteria.

Pathology.—Dunn ¹⁰⁵ _{Jan. 1} contributed a very important and instructive paper upon some mooted points concerning continued fevers of typhoid character in Minnesota. His conclusions, based upon a careful study of one hundred and fifty-four cases with eleven autopsies, demonstrate that there has been no essential fever of typhoid character prevalent in Minneapolis or the tributary country other than enteric fever. This opinion is based upon the following facts: 1. That the cases observed, while deviating more or less from so-called typical typhoid, present such symptoms that a composite picture of the one hundred and fifty-four cases could not be better painted than by the many classical descriptions of this affection given by standard authors. 2. The eleven autopsies made at random confirmed the diagnosis made in each case. The author, after carefully investigating and comparing notes of these one hundred and fifty-four cases, is inclined to believe that typhoid fever runs much the same course in his country as elsewhere. He

thinks that physicians are too inclined to hold before your minds the schematic description of a typical case and of denying essential correspondences of cases not closely conformed to this type.

As to the claim that typho-malarial fever in the sense of a typhoid complicated with a malarial element prevails in that State, he fails to see the slightest evidence. Malaria is certainly not prevalent in Minnesota; if it occurs at all, it crops out rarely and is recognized by few, while the class of cases referred to occur in all parts of the State and are met with now and then in the coldest weather of that frigid climate. There is not a distinct periodicity in the febrile action, there is an absence of icteroid hue of the skin, hepatic tenderness is wanting, and splenic enlargement is less extensive than in malarial affections. Quinine has not the slightest effect in controlling or shortening the disease.

Carroll,⁶⁰ in an introduction to a discussion on typhoid fever before the New York State Medical Association, held that there is justification for the belief that, apart from errors of diagnosis in cases where the asthenic febrile movement is the result of an overlooked tubercular, pyæmic or other determinable primary process, several disorders are commonly found under a single designation, including:—

a. A specific exanthematous fever with a localization in the intestinal glandular apparatus (to distinguish which the title "enteric fever" may be used until we gain a clearer idea of its intimate pathology); transmissible by means of a *materies morbi* developed in the excreta of the sick. One attack, as a rule, protecting against future infection. *b.* A group of acute adynamic ailments (for which the generic term "typhoid" may be provisionally retained), comprising, (1) a septic enteritis (pathogenic?) giving rise to constitutional disturbances like those of enteric fever; (2) perhaps a catarrhal variety (the "gastric" or "mucous" of some writers); (3) an anomalous continued fever, peculiar to warm climates.

As to whether typhoid fever is always the product of a specific contagium from a pre-existing case or the result of filth fermentation, Carroll concludes that we must face the dilemma of either admitting the pathogenesis of a specific ferment, or, more plausibly, considering the existence of a separate filth-bred febrile disorder. The phenomena of such cases of "home-breed" fever, as

the author denominates them, correspond with the description rather of the irregular than of the typical form of typhoid. Dunn appears to regard our present knowledge as inadequate to the solution of the question as to the part played by micro-organic ferments in the causation of enteric fever. After quoting a number of authors, he leaves the question unanswered as to whether there is a disease of the lower animals transmissible to man as typhoid fever.

Defiled water, air polluted by exhalations from foul and unventilated sewers, ground air from a filth-saturated soil, and contaminated milk constitute the media of conveyance for the infection. The author does not believe in the immediate personal contagiousness of enteric fever.

As to the complications and sequelæ, it may be broadly stated that there are three classes of phenomena to be noted—those directly dependent on the local solutions of continuity, those arising from secondary degenerative changes, and those presumably caused by the absorption of septic products. Under the first category belong such common accidents as intestinal hæmorrhage and perforation. The second comprises circulatory failure, hypostatic congestion, and œdema, thrombosis, embolism, and infarctions, cerebral or meningeal extravasations, anaemia, or decadence of the nervous centres, parenchymatous nephritis, fatty metamorphosis of the liver, disintegration of muscular and other textures, sloughing, etc. To the third may, probably, be assigned peritonitis without perforation, furuncles, lymphadenitis, parulis, parotitis, some examples of lobular pneumonia, laryngeal ulcerations, meningitis, and other rarer incidents.

Hénocque and Baudouin³ investigated variations in the quantity of oxyhæmoglobin and the activity of its reduction in typhoid fever. The observations were systematically made upon eleven patients in accordance with the method devised by Hénocque. In general the oxyhæmoglobin falls to 9, 8, or 7 per cent. during the period of development and the acme, to rise again to 8, 9, 11, and 12 per cent. during the convalescence. At the same time, the reduction increases from the beginning and remains long until convalescence. Convalescence is announced by an augmentation of the quantity of oxyhæmoglobin and by the readiness of its reduction. These ameliorations occur suddenly. The quantity of oxyhæmo-

globin ordinarily diminishes from the eighth day, sometimes even from the fourth day. The daily differences often amount to $\frac{1}{2}$ to 1 per cent., exceptionally to 2 per cent. Marked diminution in the amount of oxyhaemoglobin persists during convalescence. Diarrhoea, pulmonary complications, epistaxis, and other blood loss, pericarditis, parotiditis, suppurative otitis, are followed by a diminution in the quantity of oxyhaemoglobin and in the activity of its reduction, which is, however, greatest at the moment when the temperature reaches its maximum.

Fage⁷⁰ contributed an historical review of the subject of retention of urine in typhoid and in the eruptive diseases. Handford⁶ read a paper on albuminuria in enteric fever. He gave an account of his observations in seventy-five successive cases that had been under his care in the past three years in the Nottingham General Hospital. There were ten deaths, seven of them due to perforation, giving a total mortality of 13.3 per cent. The cases were classified under three heads: 1. Those with pre-existing definite kidney disease; these cases seemed very rare. 2. Where there was abundant and persistent albuminuria, often to the extent of 0.05 up to 0.01 per cent. Among these the mortality was very high. The most marked change in the kidney in such cases was found to be interstitial, or diffuse nephritis, with glomerulitis and haemorrhage. The nephritis was probably of septic origin, like so many other complications of enteric fever. 3. Where the albumen only existed as a trace, and that only for a short time. Among them the mortality was much less. The renal changes were less definite, and sometimes scarcely any alteration could be detected. The chief alterations appeared to be vascular engorgement, with capillary haemorrhage, slight cellular infiltration and multiplication of nuclei, and cloudy swelling of the epithelium. Marked parenchymatous nephritis, with fatty degeneration of the epithelium, was not found, though some degenerative changes were generally present, but difficult to distinguish from alterations which occurred so rapidly post-mortem, especially in death from peritonitis due to perforation.

Cadet de Gassicourt²¹ has studied the initial anginas of typhoid fever. They appear in three varieties: catarrhal, ulcerative, and pultaceous. They greatly increase the difficulty of diagnosis in the beginning of the disease. He narrates three cases.

Dabney,²⁴ in a paper on the atypical forms of typhoid fever, presents the following conclusions: (1) the disease in this country is gradually becoming milder, and symptoms which were formerly thought to be characteristic and almost invariable are now much less frequently present; (2) the diagnosis of the disease is often attended with extreme difficulty, and in the early stages is generally impossible; (3) in those cases which are apparently extremely mild, dangerous symptoms may arise suddenly, and a fatal issue may ensue from errors in diet or other imprudence.

A study of hourly charts from two hundred cases of typhoid by Ampugnani,²⁵ yields the following results: 1. The temperature oscillates in the course of the day between relatively wide limits, presenting appreciable differences between one hour and another; this variation may exceed 1° C. (1.8° F.). 2. The greatest oscillation between the maximum and minimum of the twenty-four hours is found in the first three weeks; these oscillations are ordinarily of 2° to 2.5° C. (3.6° to 3.5° F.), sometimes touching as a maximum 3.3° C. (5.9° F.). In this period, however, the seventh, fourteenth, fifteenth, and sixteenth days are exceptional; on these days the limits of variation are less, and are between 1° to 2° C. (1.8° to 3.6° F.). 3. From the twenty-second day onward the oscillations are less, being under 2° C. (3.6° F.), and in the later days under 1° C. (1.8° F.). 4. In cases running a fatal course, the oscillations are commonly less and the fever has a more markedly continued character. 5. The greatest depression occurs in the morning hours between seven and ten. On the fifth, fourteenth, and twenty-first days the depression, however, is anticipated, and occurs between 4 and 7 A.M. 6. The highest temperature occurs generally from three to six in the afternoon and then falls to midnight. In fatal cases, however, the maximum is reached toward midnight. 7. High temperatures are not necessarily of evil augury; indeed, the highest temperatures recorded occurred in patients who recovered. As a rule, in the typhoids who die the temperature oscillates between 39° to 40° C. (102.2° to 104° F.), and the cases are very few in which these limits are exceeded.

Eichhorst²¹⁴ has collected the statistics of six hundred and sixty-six cases of typhoid treated at Zurich during three years' time. He found that a second attack occurred in 4.2 per cent

(twenty-eight persons). Susceptibility to typhoid infection was not destroyed by a first or second attack; cases of three and four times repeated infection were observed. The mortality of repeated attacks was the same as those of first illness, and the severity of the symptoms was the same. Men are more liable to repeated attacks of typhoid than women.

Dewèvre³⁶⁰ _{Oct.-Dec.} discusses the subject of sudden death in typhoid fever. The theory of pulmonary embolism, of thrombosis of the heart, of degeneration of the heart-muscles, of obliterative endarteritis and cardiac ischaemia, are carefully examined, and each in turn rejected as inadequate. So with the ingenious theory of intestinal reflex proposed by Dieulafoy, the curious theory of stomachal reflex of Tambareau, that of cerebral anaemia, of uræmia, and of overwhelming typhoid intoxication. Each may serve, according to the views of its advocates, best to explain cases or even groups of cases, but no one of them is generally applicable.

Sudden death, such as is here described, is a special accident of typhoid fever closely associated with the anatomical changes peculiar to that disease. It comes only in one of three ways: the patient succumbs to one of the common causes of sudden death, as haemorrhage, embolism, and the like; he dies of uræmia due to the nephritis of typhoid fever, or life is destroyed by special localization of the infecting principle upon the pneumogastrics.

Enteric Fever in Infancy and Childhood.—Keating⁵¹ _{June} contributed a valuable lecture on typhoid fever in infancy, embodying important statistics from various sources, and a particularly instructive discussion of the treatment.

Forchheimer²³⁴ _{Mar.} found that children were very frequently affected in the recent epidemic of enteric fever in Cincinnati; more than nine-tenths of the cases which came under his observation were children. This is largely to be explained by the fact that his practice was chiefly among children. In the majority of instances in children the disease begins suddenly. There is pain in the stomach, usually epigastric, without sensitiveness. Insomnia is apt to be present early, and may alternate with marked drowsiness, the child being wakeful at night and dozing during the day. Epistaxis is absent in a large proportion; 5 per cent. suffered from this symptom; usually it was of slight degree. Sneezing rarely occurs. The tongue is much the same as in adults. Bronchial

catarrh is frequent. Constipation is common. If diarrhoea occur, it is usually moderate. In the majority of the instances the spleen is enlarged. Vomiting is common at the onset of the disease, and leads to difficulties in diagnosis. Intestinal lesions are not so severe as in an adult; they are more distinctly localized, less extensive, and, as a rule, spare the large intestine. Hæmorrhage from the bowels is on this account comparatively rare. Hæmorrhage occurred only once, and there was not a single case of peritonitis in seventy cases. The nervous symptoms were marked somnolence, wakefulness, headache. Changes in the disposition occurred. Those who were studious and agreeable before the sickness became nervous, fidgety, and shy. These disturbances were protracted after convalescence. The heart suffers less than in adults. The frequency of the pulse is not increased proportionately to the fever. Complications are less common than in adults. Aphasia occurred in one instance. Enteric fever in childhood is, according to the author, apt to be followed by tubercular infection. Prognosis is favorable; the author lost not one case of his seventy. He states that during the first two months mortality is very great. The course of the fever is shorter than in adults, usually not exceeding three weeks, sometimes coming to an end in six days. Deservescence may be by gradual lysis or by crisis. In regard to treatment, the author uses early in the disease large doses of calomel, to which he attributes the power of occasionally aborting the morbid processes. He uses antipyrin, cold and lukewarm baths, and the cold pack. Alcohol is useful.

Farnham⁵⁰, reported a case of enteric fever in a child three years old, who developed enteric fever at the beginning of her father's convalescence in the same disease. The child complained of being tired, became fretful and indifferent to what usually interested her, and was hot and flushed in the afternoon. These symptoms first appeared about the 1st of November. Temperature reached 104.8 F.^o (40.4^o C.) on the seventh day, when she was put to bed. Deservescence was complete on the sixteenth day from the first appearance of the symptoms, and the temperature was subnormal for the succeeding ten days.

DeWitt⁵¹, reported a case of enteric fever in a boy, aged twelve, who developed on the twenty-third day marked hysterical symptoms, associated with supraorbital neuralgia, and with pain

and stiffness in the muscles of the back. These phenomena came on at the time of the higher temperature. Ollivier¹⁴ reported a case of typhoid fever with gangrene of the extremities and infarct of the kidney in a child ten years of age. The disease was of moderate intensity, and ran its course normally until the nineteenth day, when there was sudden pain in a portion of the left lower extremity, followed by the apparition of violaceous spots and rapid falling of temperature. At the same time there was a difficulty in speech amounting to a form of aphasia, thin fluid discharges from the bowels, and the area of discoloration of the limb rapidly assumed the aspect of dry gangrene. Four or five days later the child died. At the autopsy the following lesions were found: (1) an obliteration of the left femoral vein; (2) an infarct of the kidney; (3) a broncho-pneumonia; (4) a normal heart. The gangrene was evidently the result of obliteration of the femoral, due either to (a) a thrombosis consecutive to an endoarteritis, or (b) to embolism. The author ascribes it to the latter.

Ewens⁶ publishes a fatal case of typhoid fever followed by measles, parotitis, and sloughing of the face in a child aged twelve. Christie¹¹² reported a case of measles developed during the course of enteric fever in a child eleven and a half years old, which terminated fatally with convulsions. Matiegka⁸⁸ likewise reported a case of the combination of enteric fever and measles in a lad sixteen years old. The symptoms of enteric fever were well marked on the fourteenth day of the attack. The eruption of measles appeared upon the face and rapidly spread over the whole body. It is noteworthy that the boy had in his fifth year suffered from measles with the other members of the family. Ringer⁶ reported a case of measles occurring during the course of typhoid fever in a girl aged ten. The patient recovered. Ringwood,⁶ apropos of a case of measles occurring during the course of typhoid fever in a patient under the care of Dr. Ringer, communicates notes of a case in which the patient not only had measles and (enteric?) fever concurrently, but also a severe attack of diphtheria followed by scarlet fever and chicken-pox, all within the space of seven weeks. In the course of his communication he asks the following interesting question: "Was all this conglomeration of diseases only different phases of one continuous blood-poisoning, Nature's endeavor to expel the poison resulting in violent storms, each storm

being attended with the group of symptoms that we are accustomed to describe as different diseases; or, did the germs of five different diseases live harmoniously and flourish synchronously in the blood of this sorely tried patient, feeding on the same diet, and avoiding internecine warfare; or, did each attack, contrary to usual experience, leave in her system for food the germs of each successive disease during the last six months?"

Jacobowitsch¹⁵⁸ has made an important contribution to our knowledge of the metabolic changes in typhoid fever in children. The urine gives, perhaps, the best indications of the tissue changes. As in any other disease, he insists on the necessity for knowing the actual quantity of nitrogenous material daily ingested, and also the quantity of urine and other excreta, together with the daily loss of carbonic acid and water. There is a considerable diminution in the quantity of urine passed during the pyrexial period, but no definite correspondence was noted between the elevation of temperature and the quantity of the urine. At the end of the first week there was a loss which varied from fifty to two hundred cubic centimetres, and even to five hundred cubic centimetres in some cases, the quantity voided being only one-half of the normal. These diminutions were rather increased during the second week, whereas at the end of the third week the quantity tended again to rise, and in some of the cases was twice the amount of the second week. During the fourth week the normal was still not reached. As a rule, the color of the urine was deeper red the less the quantity passed; but this did not always obtain, for in some instances the color was nearly natural. The reaction was usually acid—sometimes, however, only slightly. As was to be expected, the density of the urine was inversely proportional to the quantity. Gerhardt states that albuminuria results from variations in blood pressure due to the pyrexia, but Jacobowitsch does not substantiate this, for he detected no albumen in the urine in his cases at any period of the disease. The estimations of the urea discharged during the disease are very interesting, and appear to be arranged in two classes; in one the urea discharge was large during the first week, but then gradually lessened as the disease progressed; in the other class the discharge of urea gradually augmented with the continuance of the fever, and continued to rise until the fever ended. The uric acid discharged was found to correspond with

the elevation of temperature, and to be greater during the pyrexia of the first period than during the later stages of the disease. A diminished excretion of chlorides was noted all through the morbid process. The excretion of phosphates and sulphates also was grouped into two classes like the urea, in one the quantity being increased at first, but then lessening by degrees, and *vice versa*. Jacobowitsch believes that the activity of the poison in the blood has more influence in altering the urine than has the fever or the febrile accompaniments.

Levin^{6 July 14} investigated the lesions of the ganglia of the trunk of the pneumogastric. He finds that in typhoid the ganglion is frequently affected by an inflammatory process, there being marked hyperæmia, and sometimes extravasation of blood or granular changes in the nerve-cells, which leads to their atrophy or breaking down, and to hyperplasia of the connective tissue of the nerve. These morbid changes have as their result, as Dr. Levin believes, typhoid laryngitis and paralysis of the pharynx, cardiac irregularities unconnected with high temperature, the so-called "sudden death of typhoid," spasmodic dysphagia and vomiting, and finally dilatation of the stomach, observed by many authorities in cases of typhoid.

Association of Other Acute Infections with Enteric Fever.—Manquat^{14 Nov. 14} discusses this subject as follows: 1. The broad statement is made that two general affections may develop simultaneously in the same subject. The two morbid states may be chronic, as syphilis and scrofula, tuberculosis and diabetes, diabetes and paludism, paludism and oxaluria. 2. An acute general malady may arise in any individual suffering from a chronic constitutional disease. 3. Two general acute maladies may undergo an evolution simultaneously in the same subject. The fact is to-day indisputable, but it must be remembered that these accidents are rare; it would appear that the organism wholly invaded by the infecting principle of one malady is for the time being less susceptible to the specific infection of another general acute malady. Nevertheless, many examples of such association are recorded. Pneumonia is a striking instance of this.

Apropos of an interesting case of the simultaneous evolution of enteric fever and scarlatina, the author gives an elaborate review of the whole subject of the association of these two diseases.

Couturier⁶ has observed a case of disseminated sclerosis in which great amelioration of the symptoms was apparently produced by an attack of typhoid fever, the ankle clonus and other exaggerated movements being notably diminished.

A case of enteric fever is recorded¹⁷⁷ in a girl nine years old, who, upon the seventeenth day of her illness, was seized with colic, and fell into a syncope, which was followed by intestinal haemorrhage. At the post-mortem examination one of the Peyer's patches was found deeply congested, violaceous, ulcerated, and perforating the intestine. Internal haemorrhage in the course of typhoid fever in children is exceptional. Simon, in twenty-one years of practice, encountered only three cases, all of them children about the age of eight or nine years. Two recovered. Potain¹⁰⁰ reported the case of a man forty-seven years old, well-nourished, formerly a *valet de chambre*. Being out of a place, he entered the hospital two and a half months previously as a nurse. After a little time he experienced depression and loss of appetite, and his tongue became white. Upon purging he improved a little; a month later he was obliged to take himself to bed with fever, coated tongue, and diarrhoea. After purging he was able to again undertake his duties, but from this time he became depressed, suffering from malaise, which, gradually increasing, obliged him to become a patient. Fifteen days later he complained of active headache and general depression, the tongue becoming deeply furred; upon auscultation signs were negative. Examination of the abdomen showed not a single spot, but an enormously enlarged spleen. The temperature was 39.8° C. (103.6° F.). The diagnosis was uncertain. The patient had never resided in a malarious country, never suffered from intermittent fever. After a time, however, the spleen diminished in volume, which would not have been the case had he suffered from malarial fever. The case is not fully reported.

Bruhl¹⁵² reported a case observed in the Hôpital de la Charité. Patient, aged sixty-one; admitted on the first of August, 1887; of robust constitution; exempt from hereditary taint; married; father of a family; not addicted to alcohol; subject to migraine; suffered from chronic bronchitis, which had, however, no influence upon his general condition. A month prior to admission he had lost appetite, was depressed, easily fatigued. He entered the hospital in a very apathetic condition; suffered from frontal headache

of moderate intensity; had neither epistaxis nor vertigo nor ringing in the ears. From the time of admission his tongue was dry and tended to become fuliginous; there was moderate meteorism, no abdominal pain. Five days after admission, spontaneous diarrhoea occurred, amounting to from three to five passages daily. Patient complained greatly of dryness of the mouth, pharyngitis, and laryngitis. The throat was red, voice hoarse, deglutition occasionally painful. The hebetude was pronounced, the patient replying unsatisfactorily to questions. The diagnosis of typhoid fever was obvious. The evolution of the affection was normal; in four weeks the patient was completely apyretic and recovered his appetite. During this time temperature range was continuous, oscillating between 38.5° (101° F.) and 39.5° C. (103° F.). Pulse was slow and dicrotic. Patient continued to cough and expectorated moderately, and upon auscultation there were coarse mucous râles. On the 24th of August the tongue was still dry, but it was red and not coated; the patient aroused himself, stated that he felt better, and asked for food. Bronchitis also improved and the râles disappeared. From the 29th of August convalescence progressed regularly without accidents. On the 21st of September, after a convalescence of three weeks, the patient was discharged to the Convalescent Hospital at Vincennes. The day after his arrival at Vincennes, after exposure, he took cold and the cough returned. The following day there was recurrence of fever and diarrhoea. On the 3d of October, he was sent back to the Charité. Upon his arrival the temperature was 39° C. (102.2° F.); there was diarrhoea amounting to eight or ten discharges, liquid, yellow, fetid, in the course of twenty-four hours. The cough was excessive and the expectoration abundant. This illness proved to be a well-characterized attack of typhoid fever. The rose spots were numerous, the bowel distended, the right iliac fossa tender upon percussion, etc. Auscultation of the lungs revealed the signs of generalized bronchitis. Diagnosis of relapse of fever was made. On the 10th of October the temperature became higher, and on the 11th reached 40.4° C. (105° F.). At this date there was intense dyspnoea with great adynamia. The patient showed extensive dullness at the right base, where there was also upon auscultation a mixture of crepitant and fine subcrepitant râles and tubular breathing. Eight days later the patient

entered upon convalescence, which was somewhat prolonged, but terminated in complete recovery. This case is a good example of typhoid fever in advanced life.

The prognosis of typhoid fever at this period of life is generally grave. The patients frequently succumb to the attack, a fact which Bruhl invokes to explain the rarity of relapse. In this case the relapse was very well marked, although late. It must be regarded as a well-characterized recurrence of the permanent infection.

Da Costa¹⁴ reported a fatal case of enteric fever complicated with suppurating inguinal bubo of the left side. There were no indications whatever, upon careful examination, of any form of venereal disease.

Winkouhoff^{Dec. 7} has placed on record a case of gangrene of the mouth and partial necrosis of the superior maxillary bone occurring at the beginning of convalescence from typhoid fever in a little girl six years old. Swelling of the left cheek was observed on the eighteenth day of the sickness, when there was also noted excessive fetor of the breath. On the third day a black spot the size of a pea made its appearance near the left angle of the mouth. Great redness of the right side then appeared. On the seventh day the eschar separated, leaving a circular perforation the size of a franc communicating with the cavity of the mouth. The case ended in recovery.

Da Costa⁶² reported a case of repeated intestinal haemorrhages with periostitis of the left tibia in a man thirty-five years of age. The case terminated in recovery. Vinay²¹¹ relates the case of a man of twenty-four years of age who died on the eighteenth day of typhoid fever, after violent pains in the right side. He had been treated by cold baths and sulphate of quinia. Two or three days after the discontinuance of the cold baths, which were not well borne, there developed an eschar over the sacrum. At the autopsy there was neither peritonitis nor ulceration of the Peyer's patches; the spleen was voluminous. At its anterior inferior border was a small inflammatory focus of the peritoneum covering an abscess the size of a walnut; also miliary abscesses in the kidneys.

Whence came the germ which had produced this pus, from the eschar of the sacrum, a pyogenic microbe, or from the bacillus typhosus itself? Roux inoculated the pus from the abscess in

tubes of gelatin, and obtained pure cultures of Eberth's bacillus. Potato cultures gave colonies of the same microbe.

Lineæ Albicantes in Typhoid Fever.—Troisier⁴²⁰ has given an interesting account of the atrophic lines so common after any distention of the skin which appear without any obvious cause of stretching. Manouvriez and Bouchard have recorded such cases occurring in the course of convalescence from typhoid fever. These lines have been noticed, especially in children and young adults. Bouchard considered that they were due to stretching resulting from rapid growth after the subsidence of the fever. Troisier and Menetrier have noted that the elastic tissues of the skin are less thick at the level of the "atrophic" area, but they failed to find any real evidence of wasting of tissue; the elastic fibres were simply torn through and curled up at their broken ends. Bucquoy said that in boys the whitish lines have no special distribution, but in girls the breasts and the iliac crests appear to be chosen sites. Barié referred to a case in a girl, aged seventeen, in whom the lines were situated over the tibio-tarsal articulation on each side.

Bradshaw¹³¹ exhibited a girl thirteen years of age who had typhoid fever, followed after a fortnight by a severe relapse, and again after twenty days by a second relapse. When she finally entered upon convalescence it was found that the interior surface of the lower third of the thighs and the patellæ presented five or six horizontal parallel markings, the longest reaching to about one-third of the circumference of the limb, and about one-half an inch in width, the smallest under an inch in length and narrow in proportion. They were pointed at the ends, regular in contour, and almost precisely similar on the two legs. The condition is one of atrophy of the skin, probably due to some lesion of the nervous system. It has been described by Wilks.⁴²⁸

Sequelæ.—Lucas-Championnière²¹² recorded a case of thrombosis of the femoral artery in a female patient in the Hôpital Necker. The patient, some days after convalescence from a benign attack of enteric fever, was suddenly seized on the evening of the first day of sitting up with fever, which recurred upon the following day, when there was developed an acute pain in the left inferior member, quickly followed by loss of power of movement. The pain was especially severe in the flexure of the groin, and extended

downward in the course of the vessels. Elsewhere throughout the limb the pain was vague and diffuse, movements of flexion and extension being very difficult and painful. There was swelling, confined to the thigh, and especially to its upper part. The surface of the limb was not reddened, but slight distention of the superficial veins indicated venous stasis. The absence of redness of the integuments and of grave constitutional disturbances preclude the idea of a deep phlegmon of the thigh, such as occasionally occurs in infectious states. Still less did the symptoms point to myositis, though this affection is by no means rare after typhoid fever; it is, however, less generalized, being restricted to certain muscles and ushered in, as a rule, by violent muscular cramp. There was evidently a vascular obstruction. Palpation showed the existence of a hard cord in the course of the inguinal vessels. That this obstruction was not venous was shown by the localized oedema of the upper part of the limb, in place of diffuse swelling in its whole extent; by the normal coloration of the integuments, which were but slightly congested, instead of being wan and discolored as they are in phlegmasia alba dolens. The trouble was, therefore, located by exclusion in the femoral artery. Pulsation in this vessel and its branches had disappeared, but was to be felt in the iliac artery, and the circulation of the member was supplied by the collaterals.

This case presents an excellent picture of the symptomatology of arteritis consecutive to typhoid fever. However, obstructions of this kind are not invariably due to thrombosis. They may be produced by an embolism, in which case there is usually some cardiac affection with or without manifest signs of disturbances of the heart. When such an embolism occludes an artery, sudden intense pain arises with coolness of the extremity and very painful muscular cramp. The obliteration of an artery by thrombosis or the spontaneous coagulation of the blood in acute infections is extremely rare. This form of thrombosis is much more common in the veins. Finally, the obliteration by arteritis is much more frequent. It was probably produced in the above-mentioned case by movement. It always occurs at the points of flexure and curve in the arteries. The clot which leads to the complete obliteration of the artery is not necessarily voluminous, as there is associated with it thickening of the internal coat of the artery, a fact which

explains the occasional re-establishment of circulation in the course of a few days. In the case under discussion the clot underwent resorption or disintegration without producing secondary emboli. There are, however, grave forms followed by gangrene. In one group of cases the onset of sudden and general gangrene is rapidly established. In another group the pain is subacute, violaceous patches appear, and gangrene gradually develops. In cases that terminate favorably there is apt to persist a certain degree of impairment of motion. Rendu saw a patient, who, as a result of arteritis following typhoid fever, was rendered incapable of military service. In the greater number of cases the interference with movement persists for several months.

Treatment consists in absolute repose, tonics, and an abundant dietary. Massage is to be avoided.

Ollivier³ reported a case of chlorosis occurring after typhoid fever in a girl aged fourteen years. There is no reason to believe that the chlorosis was dependent upon rapid physical development nor upon menstruation. An important fact was the improper management during the course of the attack of fever and the persistent and abundant diarrhoea during and subsequent to the evolution of the illness. The alimentation had been throughout insufficient. Prognosis was favorable, and treatment consisted in the employment of iron and quinine. Arsenic was also indicated. Good results were obtained from hydrotherapy; both general and local; later, in the form of douches over the spleen.

Zenner²⁴ reviews the present state of knowledge in regard to nervous manifestations of enteric fever. As regards prognosis, he calls attention to the fact that delirium is more common in severe cases and is to that extent an unfavorable indication. Further, the greater the delirium, the greater the danger to life, while the mortality with light delirium is less than 20 per cent. In cases of severe delirium it reaches over 50 per cent., and when the delirium is complicated with sopor to almost 70 per cent. The mortality of initial delirium is high, being more than 30 per cent., and that of delirium occurring during the first week of the fever is over 40 per cent. The value of delirium in prognosis consists in the fact that it is to some extent, according to the author, a measure of the gravity of the infection. As to the restoration to mental health, about one-third of the cases get well within a week, while in one-

fourth the mental disorder continues for months and years, and in one-half of the latter class it becomes permanent. The prognosis is more favorable in febrile than in post-febrile. Of the former more than one-half get well within a week, while less than 7 per cent. are incurable; of the latter, however, only one-sixth get well within a week, while 20 per cent. are incurable. In many cases of typhoid, even after complete convalescence, a weakened condition of the nervous system remains which predisposes to future nervous diseases. The necessary treatment is mainly that required by the typhoid fever itself and the systemic conditions present. The author points to the fact that the introduction of antipyretic treatment appears to have lessened the frequency of delirium, and quotes Betke to the effect that prior to the use of the cold-water treatment delirium occurred in 26.7 per cent. of the cases in the Basle Hospital, while since its use delirium has been reduced to 19.3 per cent.; also, that the mortality of delirium cases, which before the use of cold water was 43.5 per cent., has been reduced by that treatment to 30.5 per cent.

Ross,⁹ in discussing some forms of paralysis which follow typhoid fever, first showed that while typhoid is a great strain on the nervous system, bringing to light its weaker points and causing general exhaustion and anaemia, it produces sometimes nervous lesions in addition to these. These lesions consist in proliferation of connective tissue (interstitial neuritis) about the nerve-trunks, usually, but also parenchymatous degenerations of the spinal cells and cerebral cortex. The results are paralysis, paraplegia, and sometimes loss of sensation. These are, however, usually recovered from. They are undoubtedly caused by the typhoid poison, not the fever exhaustion or the anaemia. The signs of exhaustion of the nervous system are constant and generally in proportion to the severity of the fever. The nervous phenomena are almost invariably both motor and sensory. The variety of forms taken is very great, though mainly the nervous injury is manifested by pains, areas of increased cutaneous sensibility, and paralysis.

Parker²¹³ reported a fatal case of enteric fever in a male, aged twenty-four years, in which the post-mortem examination revealed the following signs of meningitis: "Dura mater firmly adherent to the bone; whole surface of brain, base, as well as convexity,

presenting signs of inflammation; opposing surfaces of Sylvian and longitudinal fissures adherent."

Lesage⁹² observed a case of hypertrophic myopathy secondary to typhoid fever in a man twenty-seven years old. On the nineteenth day of the attack there was suddenly developed an acute pain in the left thigh, with great tenderness upon pressure in the course of the deep vessels. This pain extended to the extremity of the limb. There was slight œdema. Diagnosis of phlegmasia was made. Some months afterward there was found a general increase in volume in the left lower limb. It was decidedly greater than the right. The hypertrophy affected exclusively the muscular masses. The muscles were of firmer consistency in the left than in the right leg. The electrical reactions were identical with those of the other leg. There was no reaction on degeneration. The reflexes were normal and equal on both sides. There was no idiomuscular contraction. The sensibility was normal and identical on both sides. There was neither anaesthesia or hyperaesthesia. Pain and tenderness were alike absent. After fatigue there were cramps. The surface temperature of the affected member was $2\frac{1}{2}^{\circ}$ C. ($4\frac{1}{2}^{\circ}$ F.) higher than the sound member. There was slight œdema and cyanosis toward evening after the patient had been all day upon his feet. Muscular hypertrophy gradually increased, and after a few months became stationary. It has not changed during the past two years.

Diagnosis.—Potain¹⁰⁰ calls attention to the fact that the diagnosis in some cases is rendered obscure by the diminution or absence of certain symptoms, in others by the predominance of certain symptoms or by some complication. When the fever is of mild type during the first week the diagnosis becomes very difficult, and halts between: 1. An ephemeral fever, the cause of which is not apparent, and which may be of the same nature as that of enteric fever. But here in three or four days the affection runs its course, and the stages of the malady are much more rapid. 2. Scarlatina; but here we have the throat affection and temperature reaching a maximum in the course of the first day or two. 3. Variola; the more gradual access of fever through the first three days associated with pain in the back and vomiting. 4. Measles; evolution in four or five days, bronchial catarrh, and oculo-nasal catarrh. 5. An inflammation of the deeper structures

of the ear, intense cephalgia, great mental depression, active fever with marked oscillations of temperature, localized pain, tenderness upon pressure over the mastoid processes, impaired hearing upon the affected side. 6. Pneumonia; diagnosis is sometimes difficult in the case of intensely developing pneumonia, the physical signs of which at first and during the early days may escape attention. 7. Interstitial nephritis; this affection may be accompanied as the result of insufficient elimination of waste by phenomena analogous to those of *dothiénen térie*. Diagnostic data must then be sought, not so much in the presence of albumen as in the disturbance of the circulation, as arterial tension, bruit gallop, etc. 8. Intermittent fever; here there are paroxysms which are readily distinguished from the oscillations of enteric fever. Sometimes, however, the latter rises by an access of tertial fever; in other cases, the two maladies may be simultaneously present in the same subject. Potain states that he has observed this in a young medical student, who manifested at the same time the effects of paludal and typhoid infections.

When enteric fever has advanced to the second period, we have, as a rule, the lenticular rose spots and the enlargement of the spleen. Even then, however, there are occasional cases lacking the abdominal phenomena, or extremely mild. Sometimes there is complete absence of adynamic phenomena. Notwithstanding, from the second period the fever presents a subcontinuous character. On the other hand, difficulties of diagnosis may arise from the exaggeration of certain symptoms: thus it may be confounded with some eruptive fever or with pneumonia. The signs of one or the other of these maladies after a time render the differentiation easy. 1. Ataxia; usually ataxic phenomena appear only in the second week; in certain cases, however, delirium has been observed in the first week of the attack. 2. Meningitis; but here we have initial delirium, exaggerated constipation, less intense fever. Or, the adynamic phenomena being exaggerated, the fever moderate, and coma being present, we may be led to suspect (3) uræmia; but here again disturbances of the circulation permit of a correct diagnosis. In certain cases, thoracic symptoms are so fully developed as to lead to the diagnosis of some pulmonary affection. Occasionally typhoid fever begins with pneumonia; or pneumonia may develop in the course of the fever with profound depression.

To this condition the name "typhoid pneumonia" has been applied; but then the critical defervescence of pneumonia fails to occur upon the ninth day and the disease runs its course, on the contrary, as if the typhoid fever dated from the first day of the pneumonia. In such cases, we may say that the pneumonia has been one of the manifestations of the typhoid fever. Here the diagnosis is practically impossible until several days have elapsed.

Sheard²⁵⁷ _{Aug.} sums up an elaborate paper upon enteric fever as follows: (1) that save in those cases where death takes place from the action of the typhoid poison directly on the nervous system there must be intestinal lesion to prove the existence of typhoid; (2) that with such intestinal lesion we will have distinct abdominal symptoms; (3) that acute tuberculosis and septicæmic states are often mistaken for ordinary typhoid; (4) that evening rise and morning fall of temperature, as a proof of the existence of typhoid, is deceiving.

Ball⁵⁹ _{Sept. 1} discusses the difficulties in the diagnosis of typhoid fever in an elaborate and instructive paper. Among other things, he shows the difference between acute nephritis and the renal form of typhoid fever described by Gubler and Robin. He also dwells upon the difficulties in the way of the differential diagnosis between certain forms of typhoid fever and acute rheumatism. Cases of this kind have been described by Bourcy and Wagner.

Jaccoud³ _{Nov. 22} discusses at some length the subject of abortive typhoid fever, and dwells upon the difficulties of the diagnosis. He concludes his remarks with the statement that the diagnosis of typhoid fever up to the time of the appearance of the exanthem constitutes one of the most difficult problems of practical medicine.

Geographical Distribution.—Johnson⁹ _{Oct. 8} read a paper entitled "Geographical Distribution of Typhoid Fever in the United States," in which he showed that the principal forms of fever recognized are: (1) true typical typhoid fever; (2) true typical malarial (remittent or bilious) fever; (3) adynamic malarial fever; (4) typho-malarial fever; (5) numerous obscure forms, variously reported as simple continued fever, gastric fever, autumnal fever, etc. He found that true typhoid and true remittent fever are clearly defined, and that the others are terms used to designate sometimes a case of typhoid, sometimes of remittent fever. As

regards the term typho-malarial fever, much would be gained by abandoning it altogether.

Riordan²⁰⁶ holds that enteric fever is rare in India, and that the continued fever which has been described as enteric in India is in fact a form of malarial fever; going on to say that in a few cases of remittent fever without any suspicion of enteric, he has observed what he wishes to describe as the characteristic lesion of this malarious enteritis, viz.: considerable thickening of the last two or three inches of the ileum, increasing gradually at the site of the mesenteric attachment, with deep, irregular ulceration, ragged margin, and ragged floor, as if a Peyer's patch, sometimes two, with several solitary glands and the intervening mucous membrane, eroded. The solitary glands appear to be more affected than the agminate. There is, in addition, considerable intestinal congestion, with rectal stasis, congestion, enlargement of liver and spleen, and hypostatic congestion of the lungs. A considerable number, up to twenty, of the Peyer's patches may be simultaneously affected, but this is accidental, not essential. This, he submits, is the disease of which so much is seen in India. It differs from true enteric fever in its pathology, not perhaps conclusively, but appreciably; in its symptomatology it is all round at variance with the European disease; while in its etiology it has nothing in common with the specific fever.

I regard the above statement as abundant proof of the existence of enteric fever in India.

Hamilton²⁰⁶ believes that the vast majority of cases of continued fever in India are true enteric fever.

Treatment.—Davezac,¹⁸⁸ in the selection of treatment, divides the cases into three groups, those in which the disease is benign, those in which it is grave, and those in which it is from the beginning probably mortal. In the first group of cases, the task is easy; in the second, it will demand on the part of the attendants a large degree of prudence and decision; in the third, the mischief is quickly beyond our reach. This classification, convenient for discussion, is entirely justified by observation.

I. First Group.—The evolution of the attack is simple and regular. It is not to be disturbed by any intemperate medication, such as repeated purgations, too often liable to bring about unmanageable diarrhoea, nor by a *régime* too severe, or, on the other

hand, ill-ordered. It is not to be forgotten that relapses are to be feared even in these mild cases, and that they are sometimes more redoubtable than the primary attack. These are the "typhoidettes" of Lorraine and Brouardel, always numerous in epidemics and particularly in that observed by that author at the time of writing in Brussels.

II. Second Group.—The disease shows itself to be serious, but the prognosis, in the absence of complications, continues to be favorable. Here the physician has much to do. It is possible for him to do much harm; on the contrary, he must see to it that he does great good. It is in the management of this form of typhoid fever that we employ the customary remedies: We recognize that the primitive infection of the individual by the morbid germ is not of such gravity as to render a fatal issue inevitable. The two principal dangers to the patient consist in hyperthermia, which tends rapidly to exhaust the nervous system, and, a little later, in a putrid infection which has for its point of departure the intestinal ulcerations. In addition to these, there are complications. The author declares himself a partisan of the treatment by cold baths, a treatment that may be carried on upon a sufficiently extensive scale in hospital practice, but for which in private practice it is not often possible to attain the experienced attendants and the necessary appliances. He cites the mortality at Croix-Rousse, in six years, four hundred and eleven cases, with thirty-one deaths, a mortality of 7.54 per cent., whilst prior to the introduction of this method the mortality was from 25 to 26 per cent. At the Hôtel Dieu, where the treatment is mixed or exclusively by means of medicaments, the mortality during the same period was 13.83 per cent. Every effort should be employed to overcome the resistance of families and their patients. They may have recourse to the wet pack or to lotions and affusions where the cold bath is impracticable. The author does not think internal antipyretics should be avoided; on the contrary, there are occasions when they are useful and necessary. To combat the second danger, namely, the putrid infection, internal antisepsis is necessary. The method of Bouchard, which consists in the administration of iodoform or naphthol associated with charcoal and glycerin, is somewhat difficult in practice. The patients after a time refuse to take it and become suspicious of their nourishment. The author's colleague,

Rondot, has obtained great advantage from corrosive sublimate each day. His patients show temperature curves that are most satisfactory as a result of this treatment, which has not, however, been carried on sufficiently long to warrant positive conclusions.

III. The author asks what medication we are to oppose to the fulminant cases, accompanied so often with a terrible and continuous elevation of temperature. The disease advances with rapid strides and nothing seems to check its course. The dose of the poison is too great, either absolutely, or in relation to the powers of resistance of the organism.

Ollivier²⁰³ _{Mar. 15} holds that, if you wish to apply to typhoid fever a rational, efficacious treatment, you must keep constantly in view the fact that you are dealing with an infection, and that, after having produced a certain number of lesions, this infection is reinforced by multiple intoxications, of which the principal source is in the digestive tube, which may also result from alterations in the different organs. The disease is often at its beginning, whether it be gradual or abrupt, accompanied by constipation, and the indication to combat this symptom by purgative is natural. As a result of this there is not infrequently established a diarrhoea which becomes persistent. The author recommends saline purgatives, suggests sulphate of soda or citrate of magnesia in moderate doses for the following reasons: The specific intestinal lesions are accompanied by a gastro-intestinal catarrh. The saline purgative not only relieves the constipation, but it at the same time favorably modifies the secondary catarrh. It also stimulates the function of the kidneys, which is so important in all infections. Finally, the intensity of the fever itself is modified by the action of the purgative. In practice the patient receives during the first ten or twelve days of his sickness, at intervals of three or four days, fifteen or twenty grammes (two hundred and thirty-two to three hundred and nine grains) of sulphate of soda, which stimulates the contractility of the intestine, empties it of the putrid materials which it contains, and often suffices to maintain the diarrhoea within reasonable limits. He only has recourse to astringents, such as the subnitrate or salicylate of bismuth, when the diarrhoea by its abundance constitutes a veritable danger. Calomel also has been much praised. This drug may be administered in two methods: 1. In single doses of thirty to fifty centi-

grammes (four and one-half to seven and one-half grains), which, over and above their purgative effect, have a direct action upon the microbes of the intestine. 2. In broken doses, one centigramme (one-sixth grain) every hour until salivation is produced. This method seems to have given a remission more marked than the other purgatives.

The author remarks that the microbes of typhoid fever, in traversing the intestine, effect a lodgment in the isolated and agminate follicles, and to be affected they must be there acted upon. Further (objection more serious), Bouchard found that the employment of calomel after convalescence prolonged greater feebleness and tendency to haemorrhages, and finally pneumonia and endocarditis. (The editor begs to call the attention of the reader to the fact that certain of these complications must be coincidences rather than effects of the use of small doses of calomel.)

Ollivier has employed in all his cases daily enemata, either of starch-water or of simple water, according to the presence or absence of diarrhoea. In this way lavage of the large intestine is effected, while at the same time the small intestine is caused to contract, thus relieving itself of its contents. In this manner, also, antisepsis is produced without antiseptics. Enemata of carbolic acid or antipyrin, often producing merely transient results and being liable to be followed by depressing phenomena, do not seem to merit general use. If to these means of indirect antisepsis it is desired to join medicants that in passing through the intestine may neutralize the putrid material there contained, it is necessary to follow the plan of Bouchard, which consists in the administration of insoluble antiseptics which traverse the intestine. Bouchard has proposed a complex mixture which is at once antiseptic and nutrient, consisting of the following ingredients:—

Glycerin,	200	grammes ($\frac{3}{4}$ 6 $\frac{1}{2}$).
Powdered charcoal,	100	" ($\frac{3}{4}$ 3 and $\frac{3}{4}$ 2).
Peptone,	50	" ($\frac{3}{4}$ 1 and $\frac{3}{4}$ 5).
Naphthalin,	5	" (gr. 78).
Iodoform,	1	gramme (gr. 15).

The whole quantity to be taken in twenty-four hours. The small proportion of naphthalin absorbed is eliminated as naphthyl-sulphite of soda in the urine, which it colors a dark brown. Lépine has advised for the same purpose phenacetin.

As regards antisepsis, the author regards quinine as the only

substance which at present appears to give positive results. He insists upon the importance of the disinfection of the secretions, especially of the discharges from the bowels, and recommends that the patient shall be rendered as aseptic (*sic*) as possible by the vapor of iodoform given off from a compress of iodoform gauze kept upon the abdomen during the whole course of the sickness; that the atmosphere of the room should be changed several times a day and purified by the vaporization of carbolic acid. He disapproves of antipyrin, but uses quinine to reduce temperature in doses of seventy-five to eighty centigrammes (11½ to 12 grains) when the temperature reaches 39° C. (102.2° F.).

The fever usually falls upon the same day from 5° to 1° C. (9° to 1.8° F.). The fall of 1° to 3° (1.8° to 5.4° F.), brought about by doses of two grammes (thirty-one grains) at once, the author regards as dangerous and as subjecting the patient to the risk of sudden death, such as has been attributed by Hayem to a lesion of the myocardium, by Dieulafoy to intestinal reflex, by Cornil to modifications of the blood produced by the fever. He prefers small doses given from time to time as long as the temperature remains above 39° C. (102.2° F.) and discontinued when it falls below that point. If, notwithstanding the administration of quinine, the temperature remains elevated, he has recourse to sponging, either with aromatized water, or with aromatic vinegar, as recommended by Jaccoud. He believes that the indications for the employment of cold baths according to the method of Brand are extremely restricted and that one should reserve this treatment for desperate cases, and even then he would prefer the gradually cooled bath; he expresses the same view in regard to local refrigeration by means of compresses, cold enemata, etc. The adynamia resulting from the infection, the secondary intoxications, the pyrexia resulting from visceral congestion, should be energetically combated by tonics and alcohol. The complications are to be treated energetically. Pulmonary congestion, by dry cups applied to the chest and the thighs several times a day; if necessary, by sinapisms, and, if the congestion threatens to pass into pneumonia, by blistering, which is not likely to be followed by gangrene. One must be on his guard against otitis. The throat must be carefully inspected and gargles of Vichy water, solution of borax, or applications of nitrate of silver are recommended. The mouth is to be carefully

cared for. If vomiting occur, its cause is to be carefully investigated ; it is often found to be due to an indigestion produced by the alimentation or medication. Much importance is given to the necessity of a systematic analysis of the urine. Insomnia of the early days is to be treated by aromatic draughts or small doses of chloral, measures to which it does not always promptly yield. He considers opium inadmissible at this period. Delirium is much more favorably influenced by cold bathing than by medicines. Musk associated with camphor in pills has been found advantageous. Intestinal haemorrhage and perforation are to be treated by small doses of opium repeated every hour. Eschars are to be bathed with solutions of boric acid and dressed with iodoform gauze. Abscesses and furuncles are to be incised and dressed antiseptically. Constipation occurring at the close of the attack is to be treated by castor-oil or by emollient enema. To stimulate the appetite and to relieve intestinal atony, the bitter tonics, and especially *nux vomica*, are recommended ; more frequently, it will be necessary to restrain the patients from eating too much food.

The editor has introduced the above extract, not as an example of the views at present held, but because he considers it desirable for historical purposes to represent all phases of current opinion.

Bathing.—Glénard²¹¹ _{App. 3} reviews the subject of the treatment of typhoid fever by cold baths in the French army. He states that this method of treatment, which has been employed in the hospital at Lyons for fifteen years, has only recently been adopted in the Paris hospitals.

Juhel-Rénouy³⁵ _{App. 7} read a paper before the Société Médicale des Hôpitaux on cold bathing in typhoid. He had treated forty-three cases in this way, with only three deaths. Sixty-five baths were given in each case. The nature of the disease was established beyond a doubt in every instance. In the discussion Juhel-Rénouy stated that cold baths prevent haemorrhage, pulmonary complications, and syncope, modify the diarrhoea, and clear the urine, which is secreted in great abundance. Among his patients were pregnant women, hysterical, alcoholic, and tuberculous patients. In cases of perforation of the intestine and peritonitis, cold bathing should never be employed. Dujardin-Beaumetz remarked that Quinquaud had proved that cold baths increase organic combustion,

and consequently the production of heat. He admitted that cold baths may act as a tonic, but the same result was obtained with tepid baths, which were not so dangerous. The increased arterial tension produced by cold baths might cause sudden death in cases of cardiac weakness. Richeaux had treated seventy-six cases by the ordinary methods, and thirty-eight by the method of Brand. In the first series the mortality had been 10 per cent.; in the second series, 5.25 per cent. He was convinced that the cold baths had saved the lives of certain individual cases. "Typhoid cases present an entirely different aspect since the methodical employment of cold baths. Medication by cold baths is not to be classed as part of ordinary treatment. It is a true method, applicable to almost all cases, and which produces in almost all positive advantages, and which is only rarely contra-indicated." The bronchitis of enteric fever, the infectious nephritis, among others, constitute a special indication for the use of cold baths. Of two cases of intestinal haemorrhage, one, due to ulceration of the intestine, in a patient not treated by baths, terminated fatally; the other coming on early, probably due to congestion, in a patient who was nevertheless subjected to the treatment by baths, terminated in recovery.

Vigier treated thirty-six cases by the systematic cold bathing, with three deaths—5.5 per cent. Cozal expressed himself as follows: "In the last epidemic of typhoid fever at Claremont it was impossible for me to rigorously employ the method of Brand among the soldiers; nevertheless, I gave many cold baths, and I am persuaded that this method will become general. Among sixty or seventy patients forty were subjected to bathing, and these the more ill. The attendants got into the habit of saying, 'It is the worst case which will recover,' so striking were the results. In my opinion cold baths, far from favoring the occurrence of intestinal haemorrhage, constitute an excellent means of preventing it. It is the same with bronchitis, and I willingly affirm that the important groups of symptoms respond to this treatment in the following order: (1) broncho-pulmonary affections; (2) ataxic conditions; (3) intestinal haemorrhages. I favor the treatment of typhoid cases in a ward by themselves. It is more convenient for this method."

Barth thought it was going too far to say cold baths prevented pneumonia. The author advocates the compulsory treatment of

typhoid fever in the army by this method, and cites the well-known reduction in mortality in the German army in its favor.

Apropos of the German military regulation in regard to this treatment, and to prevent hasty conclusions upon its value, Vögl recognizes the obvious objections to general orders in regard to treatment in a vast military organization, but points out the advantages of this plan as leading to the accumulation of a large experience and in overcoming individual prejudices on the part of military physicians.

On the other hand, Péter continues to oppose treatment by cold baths by the theoretical objections which he had already formulated in 1876 to 1883. As against the statistics showing the results of the cold-bath treatment, he opposes, on the one hand, those of the expectant method by showing a mortality of less than 10 per cent., and, on the other hand, those of the pretended methods of physicians who employ three or four tepid baths during the course of the day and report a death-rate of more than 15 per cent.

Ziemssen ¹⁰⁹_{Mar. Apr.} especially recommends the lukewarm bath gradually cooled. The patient sits in a bath of 87° to 92° F. (30.55° to 33.33° C.), and the water is kept in constant motion and splashed continuously on the parts out of water. It is to be cooled down about ten degrees by cold water poured on the patient's feet. The duration of the bath should be not under fifteen minutes nor over thirty. This form of bath is suited for most cases. The very cold baths Ziemssen condemns as causing too great shock, but he does use as low a temperature as 67° F. (19° C.), being guided by the fever and nervous disturbance. A warm bath Ziemssen has found very beneficial in the adynamic state. Of the use of antipyretics, strange to say, Ziemssen says nothing, barely referring to antipyrin as preferable to other antipyretics.

Glénard ¹¹⁰_{Feb.} gives the following outline of the technique of the treatment by cold baths. There are three kinds of baths applicable to the treatment of typhoid fever—the full cold bath, the half bath with affusion, and the full warm bath gradually cooled. Each of these may be employed in accordance with special indications:—

1. The full cold bath of a temperature of 18° to 20° C. (64.4° to 68° F.), and of the duration of fifteen minutes, into which the

patient is plunged up to his neck. This bath is stimulating and refrigerant. The indication for its employment is found in a great majority of cases.

2. The partial bath with affusions. The temperature of the bath is 28° C. (82.4° F.), duration from five to ten minutes. The patient is placed in it up to the nipples; the affusion consists in pouring upon the back and neck water of 10° C. (50° F.); after that he is briskly rubbed in the bath with a sponge or brush. This bath is stimulating, and is to be employed in typhoid fever of high temperature and where complications occur, especially the chest complications.

3. The warm bath gradually cooled, the temperature to be between 5° and 6° C. (9° and 10.8° F.) higher than that of the patient, the duration from twenty to thirty minutes. During this interval the bath is gradually cooled by the addition of ice or cold water until the temperature at the conclusion of the administration falls to 20° C. (68° F.). If shivering occur the patient is immediately taken out of the bath and placed in his bed, which has been previously warmed. This bath is refrigerant, but without stimulating influence. It is to be employed in cases in which there are affections of the heart, emphysema, etc.

Experience has shown that unfavorable results are avoided when the cases come under treatment before the fifth day. It is desirable for a physician, who is not personally familiar with the action of cold water in the treatment of typhoid fever, to commence by employing it in simple cases, especially in cases which come under treatment prior to the fifth day of the attack.

The following plan is that invariably to be employed under such circumstances: In a suspected case of typhoid fever seen at the beginning, the choice lies between a large dose of calomel and the treatment by cold baths, the preference being given to the latter if the presumption of typhoid fever is strong. If the diagnosis of typhoid fever is probable, recourse should be had to the baths, whatever may be the symptoms. The full tub should be placed in the ward or chamber, parallel to the bed at a distance of one or two metres, the floors properly protected by oil-cloth, and a screen placed between the bed and the bath-tub. A sufficient quantity of water should be used to cover the patient's body to the neck. It should be of a temperature of 18° to 20° C. (64.4° to 68° F.).

The baths should be prepared without disturbance or noise. There should be placed on the floor near the head of the full tub two pitchers of cold water of a temperature of 8° or 10° C. (46.4° to 50° F.), each containing four or five litres (quarts). A glass of water should be at hand. The first bath should be given preferably about four o'clock in the afternoon, unless there is some urgent reason for selecting a different hour, and the physician should be present. The rectal temperature is taken, the urine is voided, and the patient is assisted into the full tub, the screen having been removed. If there is perspiration the patient is dried before entering the bath. Cold water from the pitchers is poured upon the head and the back of the neck from a height of eight or ten centimetres (thirty-nine inches) for one or two minutes, the amount being from two to three litres (quarts). Then a swallow of cold water or red wine is given. This being done, the whole surface of the body is briskly rubbed with a sponge or brush. The patient is made to rub his abdomen and chest. These frictions stimulate the peripheral circulation, prevent the accumulation of heat at any one point, moderate the sensation of cold, and help to pass the time; they are not indispensable. Shivering appears, as a general rule, between eight and twelve minutes; this is a necessary evil to which too much attention is not to be paid. Toward the middle of the bath, or at its termination, cold water is again poured over the head and neck. The time occupied ought to be at least fifteen minutes, longer if the head is still warm and the cheeks red, or if the temperature of the patient has been very high before the bath.

The patient should leave the bath without precipitation; he cannot take cold. Thoracic complications are caused by typhoid fever and not by chilling. The air of the apartment should be pure and not too warm; the window should be opened in the interval of the baths; during the bath it ought to be closed. On leaving the bath, the patient should be lightly dried with a towel. The bed should be carefully made during each bath. If on returning to the bed shivering takes place, the limbs should be rubbed and a hot bottle placed at the foot of the bed. A cold compress, covered with oil-silk or flannel, should be placed over the abdomen, and a little warm nourishment administered.

Three-quarters of an hour after the bath the rectal tempera-

ture should again be taken. The general prescription for the administration is as follows: A bath of fifteen to twenty minutes every three hours day and night as often as the rectal temperature taken three hours after a bath reaches or passes 39° C. (102.2° F.). During the bath douche the head and neck three times, each time with two or three litres of water of a temperature of 10° C. (50° F.). A small quantity of nourishment is to be given after each bath, that is to say, every three hours. Alimentation should consist of the following articles: milk diluted with coffee or tea or cocoa (a quarter of a litre each time); gruel or oatmeal, tapioca, or vermicelli, thoroughly cooked; veal, mutton, or chicken broth, freed of fat when cold and re-heated at the moment of administration. As a drink, pure cold water; the indication for wine or spirits is only urgent in cases that are subjected to this treatment late in their course. If the patient does not sleep, or sleeps badly, he is to have a draught of iced water, and the abdominal compress is to be changed every quarter of an hour. The rectal temperature should be taken and recorded every three hours, before the bath, and forty-five minutes after each bath. If the temperature before the bath is below 39° C. (102.2° F.), the bath may be deferred until it again reaches 39° C., the temperature being then taken every hour. If it is found, however, to be below 38.5° C. (101° F.), it is not necessary to take it again for three hours. The discharges from the bowels are to be preserved for inspection, and the total quantity of urine collected in the same vessel. Neither age, sex, menstruation, pregnancy, nor sweating (except that which occurs at the end of defervescence) in any way modifies the treatment. In women who are weaning their children, cold compresses must be frequently renewed upon the breasts. If diarrhoea persist, it is to be combated by cold compresses, which may be kept cold by the aid of a bladder of ice. If there is constipation, it is to be treated by cold enemata, and, if this fail, by enemata consisting of one part of cold water and one part of fresh ox-gall.

When temperature before the bath is very high, or the fall forty-five minutes after the bath is less than 1° C. (1.8° F.), the bath must be prolonged to eighteen or twenty minutes. It is very rarely necessary to modify the general formula. When the temperature does not exceed 39° C. (102.2° F.) but yet reaches 38.5° C. (101° F.), it is necessary to treat this little exacerbation by baths of

20° C. (68° F.) and five minutes in order to prevent the prolongation of the fever or the occurrence of relapse, and to shorten convalescence. If relapse occur, it must be treated according to the general formula. When the temperature no longer exceeds 38.5° C. (101° F.), the defervescence is terminated, the baths are discontinued, and the patient ought to be treated as convalescent, but is to be kept in bed until for four days the temperature has not at any time exceeded 38° C. (100.4° F.). He may then rise and in a short time walk in the garden; he may prolong his promenades according to his strength, and one will be struck with the rapidity with which it augments with every outing. Proper precautions are to be taken against cold. As to alimentation, already during defervescence, when the temperature no longer reaches 40° C. (104° F.), there may be added to his soup, milk, or bouillon, either one or two raw eggs daily, or, a little later, one or two spoonfuls of scraped raw meat or a little toasted bread or biscuit; but the aliment must always be given as liquids.

The *régime* of the convalescence will be gradually established, and may consist of solid food, when for four days the temperature has not risen above 38° C. (100.4° F.). At this period the intervals between the meals will be at first three hours during the day; afterward add one meal daily; and a little later, morning and evening, the patient may have roast beef, fish, and bread in small quantities. The appetite is excellent, and it is necessary to control it. For two days in the convalescence the temperature is to be taken as before, after that, for a week, morning and evening. At the end of that time the temperature observations may be discontinued.

During the treatment by baths, one attendant is required for the day and one for the night; these duties may be fulfilled by members of the family. In a hospital one bath-tub may be made to do for a dozen patients, but it is better to use one for six patients. Two attendants are sufficient for twelve patients. It is not necessary to renew the water of the bath every three hours; once in twenty-four hours is sufficient. The patient treated from the beginning in this manner never suffers from faecal incontinence, and the rule is the patient should pass his water before entering the bath. In time of epidemic, the water of the bath if it is not soiled should serve for several patients, and should only be renewed two or three times a day.

Such is the treatment of typhoid fever by cold baths. When thus treated from the beginning, the malady is as monotonous for the physician as for the patient. Neither the one nor the other has misgivings concerning the cure, which comes to pass without incident after a number of baths varying from sixty to one hundred, and after a duration of the fever from seventeen to twenty-five or thirty days. If the duration be less than seventeen days, the fever must be regarded as having been a gastric fever. The advantage of the treatment consists in the reduction of the duration of the disease to its minimum, and in doing away with the convalescence, which is often so prolonged.

Chéron¹⁰⁰, likewise gives detailed directions for the administration of the baths, and concludes a most carefully worked up article with the wish that the readers may be induced to experiment with the method of Brand without neglecting in any respect the directions laid down. His conviction is that success will crown their efforts.

Bouveret²¹¹,_{June 12} gives statistics of typhoid cases treated at the Hôpital de la Croix Rousse in accordance with the method of Brand, showing sixty-one cases with three deaths,—a mortality of 4.91 per cent.

Krütchek-Golüboff,²⁵,_{Dec. 15, 1877} with a view of illustrating the cardinal question of certain minor points as to the influence of prolonged tepid baths in enteric fever, carried out ten experiments on seven persons, five of whom were suffering from typhoid fever, while two were healthy. These individuals varied from twenty-one to twenty-six years of age and consisted of soldiers and hospital attendants. The observations were conducted in the hydro-therapeutic wards of the Clinical Military Hospital at St. Petersburg, where there exists a special bath measuring two hundred by ninety-two by seventy-one centimetres, and supplied with a movable bed consisting of a zinc frame with water-proof hemp net-work. Each observation was divided into three periods, viz.:—

(a) The pre-bath period of one and one-quarter to six and one-half hours' duration; (b) the bath period; (c) the after-bath period of one to seven hours' duration.

A. *Experiments on the Healthy Subjects.*—The duration of the bath was twenty-four hours fifteen minutes in one man, and twenty-four hours in another; the average duration of the whole

observation thirty-two hours fifty-five minutes; the average temperature of the bath 27.5° R. (93.87° F.) in one and 27.9° R. (94.77° F.) in another case, with the maximal level at 30° R. (99.5° F.), and the minimal at 26.4° R. (91.4° F.).

B. *Experiments on the Typhoid Patients.*—The average duration of the bath was fifteen hours forty-two and a half minutes, the maximal forty-three hours forty minutes, the minimal five hours; the average duration of the whole observation twenty-two hours ten minutes, the average temperature of the bath 27.2° R. (93.2° F.), the maximal 31° R. (101.75° F.), and the minimal 23° R. (83.75° F.). The experiments were made on the fifth, seventh (two cases), tenth, eighteenth, nineteenth, twenty-third, and twenty-sixth day of the disease.

C. The conclusions are as follow: 1. Prolonged tepid baths produce a highly beneficial action on patients suffering from enteric fever, since they powerfully lower the temperature, and the frequency of the pulse and respiration. 2. They entirely change the temperature curve, restoring its physiological aspect and favoring the appearance of remissions. 3. The greatest decrease of a febrile temperature is observed on the second and third weeks of the disease, and that especially in comparatively badly nourished (meagre) subjects. 4. The amount of defervescence is not always proportionate to the duration of the bath. 5. In morbid cases the after-bath fall of the temperature lasts longer than in the healthy persons. 6. The baths diminish ordinary daily losses in the typhoid patient's weight. 7. The manual muscular strength in typhoid cases increases. 8. Appetite, sleep, bronchial catarrh, and state of the tongue are markedly improved. 9. The gastro-intestinal and renal actions are restored to their healthy state. 10. The so-called "typhoid" phenomena, however intense, disappear, or, at least, are strikingly alleviated. 11. The baths do not produce any untoward (macerating) influence on the skin. On the contrary, the integuments become more elastic and fresher after a prolonged immersion. 12. A thoroughly good or comfortable subjective feeling experienced by the patient during the immersion is one of the most essential indications in regard to the duration of the bath in individual cases. This feeling of comfort must be kept all through by means of regulating the temperature of the water with utmost attention and care. 13. The influence of the baths under consid-

eration on typhoid fever is different from that on typhus or relapsing fever. It would be a bit of useful work to undertake comparative experiments on the antipyretic effects of tepid baths of various duration in the latter affections, as well as at various periods of enteric fever.

Love⁶¹ has used with favorable results the gradually cooled bath. He recommends that the temperature of the water at first be about the same as that of the patient, then gradually reduced down to 85° F. (29.44° C.), or 80° F. (26.66° C.). The bath may be prolonged five or ten minutes.

Paul Chéron¹⁷ has critically reviewed the discussion concerning the treatment of enteric fever in the Medical Society at Lyons. He concludes by citing the statistics collected by Glénard. Brand published a *résumé*¹¹⁶ of one thousand two hundred and eleven cases from family practice, from military hospitals, and the German Polyclinic, in all of which the method was used from the beginning. There were twelve deaths, that is, about 1 per cent. From these twelve fatal cases two should be eliminated, in one of them the treatment having been suspended upon the sixteenth day on account of arthritis, and the other terminating fatally from some unknown cause, probably due to relapse.

Brand recapitulates his statistics in the following manner:—

Cases treated in family practice—death rate,	0 to 1 per cent.
Military hospitals,	3 to 4 "
Consultation cases,	3 to 4 "
Civil hospital,	5 "

At Lyons, the Hôpital de la Croix Rousse gives 5 per cent. without eliminations, 1887; at l'Hôtel-Dieu, the figures are higher because the internes transfer all the grave cases to the service of Vinay, where they know they will be treated, and where the hygienic surroundings are very bad.

The expectant method gives 20 per cent. of pulmonary complications with a mortality of 50. per cent.; that of Brand gives 7.1 per cent. with a mortality of 35.7 per cent. One hundred cases of death under the treatment by baths shows 26.3 per cent. of thoracic complications, one hundred cases under other treatment 52.6 per cent.

The author concludes in quoting the words by which Glénard closed the discussion: 1. The method of treatment of typhoid fever by cold baths, tested for fifteen years at Lyons, has to-day

reached its full development. It has kept all its promises. Comparison with rival methods has each time been the occasion of new triumph for the method of cold baths. The great principle of its specificity, that is to say, of its systematic application to all the cases from the begining has been adopted at Lyons. 2. The Society of Medical Sciences confesses the method of cold baths a sure criterion by which to estimate the value of new methods of medication which have been presented to it. The following law once again verifies itself, that the obituary curve in hospitals of Lyons oscillates in direct ratio with the consumption of antithermic medicines and in inverse ratio to the number of cold baths administered.

Drochon ²²⁵_{Aug.} reviewed the statistics of various methods of treating typhoid fever. He finds that: 1 By former methods the mortality is about 17.45 per cent., but Jaccoud, basing his estimate upon eighty thousand one hundred and forty-nine cases collected from all sources, places the mortality at about 19.23 per cent. 2. The expectant method. Jaccoud, 11 per cent.; Péter, about the same, 10.2 per cent. In 1882-83, about the same; in 1882-83 he had one hundred and twenty-seven cases with fifteen deaths, a mortality of 10.2 per cent. Dujardin-Beaumetz, 12 per cent.; Bouchard, 15 per cent. Finally, Drochon has collected from the records of the Paris Hospitals, three thousand two hundred and forty cases with four hundred and five deaths, or about 12.5 per cent. 3. The method of Brand, six thousand one hundred and eighty-five cases with three hundred and fourteen deaths, a mortality of 5.1 per cent. 4. Mixed methods. In seven hundred and eight cases the mortality was 9 per cent.

Péter, ¹⁴_{Mar. 25, Apr. 1, 31, 25} in a series of lectures upon treatment, discusses the various methods. He declares that the typhoid fever seen in the early days of his medical life, in the time of Chomal and Louis, is no longer encountered. The excessive tympany, the baked tongue, the fuliginous nostrils, have disappeared, together with the noisy delirium and the incessant agitation. The typhoid fever of our days is much less grave than that of former times, or, in other terms, the grave clinical forms are less common. He attributes this change to the improved health of the people in consequence of better hygienic conditions, and insists upon it that the infection is always the same and that the change has taken place in the subject.

1. The expectant method. The living organism tends spontaneously to disembarass itself from infectious substances; in other words, the natural tendency is to recover from accidental acute maladies, the infecting principle and the products of infection being eliminated by the urine, by sweating with or without eruptions, and by haemorrhages. Thus the intestines, the liver, the kidneys, and the skin are the organs of elimination. The rôle of the physician is to observe the evolution of the morbid phenomena and to know how to hold his hand when this evolution is regular; for example, in the eruptive diseases, where the organism tends to throw off the specific infection spontaneously by cutaneous crisis, to which is given the name of eruption. In the milder forms of typhoid fever nothing is to be done. One should observe the dictates of common sense and follow the example instinctively set by the patient; therefore rest is to be advised, a prescription which the patient takes the more readily seeing that he usually has of his own accord betaken himself to bed. The diet is to be regulated—an easy matter in view of the presence of anorexia. Plentiful drink is to be given, which is more easy on account of the intensity of the thirst. The details of dietetics are well recognized. As to medicines, the patient may from time to time, at intervals of two or three days, with the view of facilitating the elimination, modifying the secreting surfaces, and cleansing the Augean stables, take a slight laxative, as, for example, a glass of eau de Seidlitz; and the administration once or twice a day of an enema of cold water (*mais non phénique, grand Dieu!*) should never be omitted. In such mild cases he does not even recommend the sulphate of quinia, so valuable in other forms. But should the expectant method be the exclusive treatment for typhoid fever? By no means. Systematic expectancy applied to all the cases of typhoid fever is injurious and unreasonable, just as would be any form of systematic medication, but it is the least objectionable of all the systematic medications, because in doing the patient no harm we at least give him the chance to get well spontaneously—if he can. And this is not the case with certain other forms of treatment of typhoid fever.

2. The various forms of systematic treatment. The author at this point says: “Every exclusively systematic treatment is bad because it is irrational. It is addressed, in fact, to a meta-

physical abstraction, to a creature of the fancy, a *disease*. *La dothienentérie* is a schematic abstraction; but *le dothienentérique* is a living reality. In the patient we have to do with an affection realized, individualized, that is to say, with an organism which seeks to expel the infection if it can and as it can. Thus, in a light case the patient is kept in a proper temperature, tepid enemata of light laxatives are administered, cut cups are applied to the thorax when a bronchitis arises as a complication, and thus, in consequence of a vigilant expectancy, the patient recovers. But the physicians given to systems treat their cases differently. They, supposing themselves to be inspired by the materiality of facts, are in fact pure metaphysicians, metaphysicians without being aware of it."

After reviewing in his own way (at once amusing and instructive to the student of medical history) the general subject of antipyretic treatment, both by means of the external application of cold in its various forms and the internal administration of refrigerant, or, as Péter is pleased to call them, toxic medicines, he goes on to say: "The systematic medication of the older physicians had at least as excuse a rational pretext, but the antipyretic medication has not even this pretext; it is eminently irrational. The hyperthermia of antipyretic physicians is not the cause of the accidents of the disease; it is not even the cause of the nervous phenomena, the delirium, etc., nor the cause of the digestive disturbances, the phlegmasias, or the haemorrhages which may occur in the course of the disease. It is, therefore, useless to combat it."

To these publications Juhel-Rénovy ^{Apr. 18}¹⁴ and Mollière ^{Apr. 25}¹⁴ reply, quoting accurately not only the figures of Brand, but the experiences of the Lyons school, in support of the treatment of cold baths.

MEDICINAL TREATMENT.

On the other hand, Dujardin-Beaumetz ^{Feb. 8}¹⁴ declares himself a settled partisan of the treatment of typhoid fever by that form of symptomatic medication to which he has given the name of "armed expectancy," and which has also been described under the name of "the medication of indications."

Woodbridge ^{June 2}¹⁵ discussed the abortive treatment of typhoid fever in a well-considered paper read before the American Medical Association at its meeting in May. He holds that a therapeusis

based upon the germ theory must, in view of our present imperfect knowledge, set before itself *two* aims: (1) to destroy the germs of the disease, or arrest their development; (2) to combat the ptomaines which are developed during its course.

We consider first the conflict with germs. This conflict we may well believe must be conducted on two fields: (1) on the surface of mucous membranes with germs that have not yet entered the tissues; (2) in the tissues with germs that have gained access to them.

To the question, Would intestinal antiseptis be useful if we could effect it? we may find an affirmative answer in the following facts: (a) even in health, a considerable portion of faecal matter consists of micrococci and microbacteria, and that poisonous ptomaines are developed as a result of their activity; (b) the effect of Nature's disinfectant fluid in the intestine, viz.: the bile, and its apparent effect in restraining development of the germ in the upper portion of the small intestine; (c) the results of clinical experience.

There are three periods in the disease during which we may address ourselves to germicidal, and so abortive, treatment of the disease: (1) while germs are limited to contents of the intestinal tract; (2) after they have gained access to the lymph structure of the intestine and mesentery, but while the blood is yet able to dispose of all the germs thrown into it from the glands; (3) after the production of germs has passed the limit of the blood's power to destroy them, and there occurs a general infection of the body.

His main points of treatment are as follow:—

The digestive tract receives antiseptic attention throughout.

Frequent use of an antiseptic mouth-wash, generally Dobell's solution with listerine added. To this antiseptic wash is added occasional doses of one one-hundredth of a grain (0.00066 gramme) of hydrarg. iodid. rubr. in 1 per cent. trituration with sugar—this to be used three to six times a day, allowed to melt on the tongue, and no fluid to be taken after it for several minutes. The antiseptic effect of this is doubtless felt in the mouth, œsophagus, stomach, and bowel. In order to avoid the danger of salivation this is not used after the second or third day, unless very infrequently.

The main dependence for intestinal antiseptis as far as the ileocæcal valve is sodium salicylate in doses of ten grains (0.65 gramme) every two to three hours, given either in capsules or compressed tablets.

His chief reliance from beginning to end of the disease for an antiseptic agent below the ileo-cæcal valve is a daily large enema of an improvised decoction of chamomile flowers and borax. The nurse is instructed to add a small handful of chamomile flowers to three pints ($1\frac{1}{2}$ litres) of water, and allow it to simmer, without boiling, on the stove for one hour; then to strain it through cheese-cloth to remove any woody fibre that might prove irritating; add a teaspoonful of borax and administer as an enema, giving all that the patient can be persuaded to take. At the second or third using, if not from the outset, an adult will generally take all. Retention for a few minutes is not essential, but doubtless increases the beneficial effect. This paper is based upon brief reports of ten cases.

Clemens¹⁹⁸ advocates the use of laxatives in the early period of enteric fever. He prefers castor-oil in combination with turpentine to other laxatives, and repeats it during the first week of the disease.

Fychowski,^{520 25} S. 22; Oct. 22 in sixty cases of severe enteric fever, complicated with cerebral symptoms, departing from the supposition that the cerebral symptoms were caused by faecal stagnation and decomposition, administered, three or four times daily, enemata made first of ordinary boiled water at the mean temperature, and, later on, of various antiseptic and deodorizing solutions. The results were invariably excellent. In a couple of days the stools lost their offensive odor, delirium lessened or ceased altogether, the excited patients became quiet, the apathetic cheerful, etc. The best effects were obtained from the rectal injection of a 3 per cent. solution of permanganate of potassa.

Legroux¹⁴ June 17 has used the following treatment in a large series of cases and believes in it. To all cases a good dose of calomel is first given, then if diarrhoea is prominent:—

R Naphthol,

Bismuth, gr. 40 (2.6 grammes).

Make ten powders and give one every hour in capsule or suspended in milk.

If less diarrhoea, naphthol alone in same dose.

If tendency to constipation:—

R Naphthol, gr. 40 (2.6 grammes).

Magnes. salicylat., gr. 40 (2.6 grammes).

Ten powders as before.

Legroux finds in this treatment numerous advantages, both local and general, as, e.g., disinfection of stools, diminution of

meteorism, and believes it affects favorably the course of the disease.

Muselli¹⁸⁸ _{Apr. 1} concludes a study of the dangers of hyperthermia and of some antipyretic medicines in typhoid fever as follows:

1. Hyperthermia (pyrexia) is a danger in typhoid fever by reason of its effects upon the intestine, the heart, and the entire organism.
2. The hydrotherapeutic methods employed expose the patient to grave dangers of sudden death, internal haemorrhage, capillary bronchitis, especially when it is practiced under the form of cold baths after the method of Brand. When practiced under the form of tepid baths or cold or tepid lotions, its effect upon the temperature is extremely feeble.
3. Sulphate of quinia rapidly loses its antipyretic action, since at the end of some days the febrile temperature, depressed for a time, quickly regains its former height. Its action is uncertain even in massive doses. Finally, sulphate of quinia given in large doses produces disturbances of hearing and headache, which render its discontinuance necessary.
4. Salicylic acid has an uncertain antipyretic action; moreover, it increases the tendency to haemorrhages, both epistaxis and intestinal bleeding.
5. Antipyrin lowers the temperature in a certain and methodical method. It enables us to modify the evolution of typhoid fever so that it runs its course with a moderate temperature without exposing the organism to any grave results. It is, therefore, the best of the antipyretic remedies.

Picot⁷⁰ _{Oct.} emphasizes the fact that the prophylaxis of typhoid fever demands the absolute, complete, and instantaneous disinfection of the faecal discharges of the patient. As a matter of fact, the faecal matters alone contain the bacilli, and the complete destruction of the bacillus renders the contamination of potable waters and of the surrounding air impossible. Reviewing the experimental investigations of Seitz and Chantemesse and Widal in regard to the various disinfectants in common use, he concludes that the chlorinated lime is the most efficient for the disinfection of faecal matter. Drinking-water should be sterilized by boiling. He considers an antiparasitic treatment to be rational in view of our present knowledge of the biology of the bacillus typhosus. At present we are unable to jugulate the disease, but efforts to oppose it through pullulation of the microbe are reasonable. For this purpose he agrees with Péchollier in regarding the sulphate of

quinia as superior to thallin, kairin, or even salicylic acid and antipyrin.

Ellegood, ¹⁹ _{Sept. 15} in a paper on the germ theory of typhoid fever and its therapeutic indications, suggests that a national or international experimental commission be appointed to make investigations with a view of determining the cause and best method of treating typhoid fever, and that, in addition to the lower animals, human beings, prisoners condemned to death, be made the subjects of experiment.

Antifebrin.—Way ⁹ _{Jan.} ascribes the cases of cardiac failure and collapse which have recently been reported to the improper and injudicious administration of the drug, *i.e.*, *from the administration of the toxic and not the medicinal dose of the drug.*

He claims for antifebrin, over all other antipyretics in the management of the hyperpyrexia of enteric fever, the following advantages:—

1. The size of the dose is small, and from the bland and unirritating character of the drug is easy of administration and not liable to produce gastric irritation. 2. The happy effect of the drug in reducing hypernormal temperature and in rendering the patient more comfortable by its soothing effects on the erethetic state of the nervous system accompanying febrile processes. 3. The absolute safety of antifebrin when used in medicinal doses.

Smith ²¹³ _{Apr.} says that the temperature is more or less reduced in all cases, the difference being not in all cases accounted for by the amount of the dose.

The rise after its use is not rapid, but it is more likely to be so after a large dose not repeated than after small doses given every six or eight hours. In one-half grain (0.032 gramme) doses to a child of one or two years it causes a fall of temperature of from two to three degrees. Antifebrin always relieves the violent frontal headache. After the first dose this symptom disappears, and if it does return it is not nearly so severe, and in many of his cases did not return at all. In adults he never gives more than three to five grains (0.19 to 0.32 gramme) to begin with, and this dose never produces collapse or cyanosis.

Lépine ³ _{Nov. 11, 1877} employs phenacetin, on account of its slight solubility, in cachets of 0.5 gramme (eight grains) to the number of six or eight in twenty-four hours. In these doses it has no noticeable

effect upon the heart, and produces neither cyanosis nor any other unfavorable phenomenon, except, perhaps, sweating.

Antipyretics.—F. T. Pasternatski ^{Aug. 11}⁶ brought together a number of statistics showing the effect of different methods of treating typhoid fever upon the frequency of relapses. According to his figures, relapses occurred more frequently under cold-water treatment than when indifferent or inactive drugs only were employed. Still more frequently did relapses seem to occur when large doses of quinine—thirty grains (two grammes) per diem—were combined with the cold-water treatment. When large doses of antipyrin, thallin, and acetanilide were substituted for those of quinine, the results, as far as relapses were concerned, were even worse. There is, however, this to be said, that in Dr. Pasternatski's experience none of the relapses proved fatal, or, indeed, left any permanent ill effects.

Kalb and Bartlett ^{Jan. 5, '96}² have treated a case of typhoid fever by the daily inunction of fifteen grains (one gramme) of mercury ointment for six days. In 80 per cent. of Kalb's cases the fever entirely disappeared within ten days.

Bartlett found that the temperature fell to normal in two or three days, and in five or six days all other symptoms had disappeared. The treatment is only of use when commenced before the ninth or tenth day of the disease. The diagnosis in all the cases is not positive.

J. C. Wilson ¹¹⁸⁷_{v.3} systematically treated five cases of enteric fever by means of hypodermic injections of calomel. The cases were all severe, and all recovered. Three of them ran an exceptionally favorable course. The author believes that calomel thus introduced into the organism exerts a decided therapeutic influence in ameliorating the symptoms and in modifying the temperature range in enteric fever.

Salicylates.—It will be remembered that a few years ago Desplats and Vulpian ⁵⁰⁰_{Mar. 18}; ⁸⁰_{June 10} strongly recommended salicylate of bismuth in abdominal typhus. They claimed that it not only acted as an antipyretic in this disease, but also as an antiseptic and an antidiarrhœic.

Jackson ⁶¹_{Nov. 24} discusses the subject of the carbon compounds and their true place in the treatment of fevers, or the particular types of fever in which they are indicated, with especial reference to the employment of ammonium salicylate in typhoid fever.

He concludes that the carbon compounds generally are only indicated and could only be expected to be useful in those forms of fever which are due to a fermentative process caused by organisms exhaling carbonic acid gas, since they are chiefly destructive of this class of organisms and have little or no toxic effect upon those causing fevers which are accompanied by processes analogous to putrefaction in which ammonia or sulphuretted hydrogen are evolved, *e.g.*, typhus, typhoid, and the septicæmic fevers. It is in that form termed by Woodward "typho-malarial;" ammonium salicylate is especially effective, while in pure typhoid it is not.

Caffeine Subcutaneously.—Henri Huchard²⁴ during the last four years has made frequent use of subcutaneous injections of caffeine in conditions of collapse, and finds them superior to ether inasmuch as they are less painful, more stimulant to the heart, and more diuretic. In cases where they are specially applicable the intestinal tract has generally become so incapable of absorption that as much as a drachm (four grammes) of sulphate of quinine will produce little effect if given by the mouth, and subcutaneous treatment is more desirable. The liquid he uses is a 25 per cent. solution of caffeine, along with an equal quantity of benzoate of sodium to help the solution and render it more painless.

Phosphorus.—Aycart⁴⁴¹ recommends phosphorus both as a tonic and as a stimulant. He employs an ethereal solution containing one-third of a grain (0.02 gramme) of phosphorus to one fluidrachm (four grammes) of the vehicle, and prescribes this dose in two parts, taken daily in a glass of Malaga wine.

J. C. Wilson²² treats his cases in the Jefferson Hospital by calomel, seven and a half to ten grains (0.49 to 0.65 gramme), in combination with sodium bicarbonate, ten grains (0.65 grammes), at a single dose at night, to be repeated once or twice if the case is in its first week. If the case has reached the second week this dose is not repeated, and after the tenth day of the disease it is not administered at all, small doses of calomel being occasionally cautiously employed. Diarrhea is not to be considered as a contra-indication to the use of the mercurial. If the evacuations are excessive suppositories containing one grain of aqueous extract of opium are used. Enemata of thin gruel may occasionally

be resorted to for the relief of constipation. Cold sponging of the body twice in twenty-four hours is employed. Carbolic acid, one grain (0.06 grammes), and tincture of iodine, two drops, are given from the beginning every two hours during the day, every three hours at night. Antipyrin, fifteen grains (one gramme), is given at a single dose when the temperature is over 104° F. (40° C.). Alcohol forms no necessary part of the treatment.

Gramshaw ⁶ employed carbolic acid in the treatment of enteric fever, in a mixture, of which this is the prescription:—

R	Carbolic acid,	M 12 (0.78 grammes).
	Tinct. iodine (B. P.),	M 16 (1.04 grammes).
	Tinct. orange-peel,	5 1½ (5.9 grammes).
	Simple syrup,	5 3 (11.7 grammes).
	Water,	5 8 (249. grammes).

The dose should be an ounce every four hours for the first fortnight, or until the urgent symptoms yield, when the same dose is administered three times a day. The good effect is manifested almost immediately. In two days the pulse slows and gains in strength, the temperature falls, the tongue becomes moist, all diarrhoea ceases, and the general condition of the patient is so much improved that, as a rule, in a week all anxiety is at an end, and the case progresses quietly toward recovery.

He gives a "rough analysis" of one hundred and sixteen cases thus treated: Seventeen were children, ten adolescents, and the remaining eighty-nine adults, the sexes of the total number being about equally divided. They belonged to all ranks of life, and the surroundings of some of the poorer cases were not conducive to cleanliness or the possibility of good sanitary arrangements. *The result in every case but one has been complete recovery*, and that one fatal case calls for the explanation that death did not take place until long after the fever was over, and from quite an accidental and adventitious cause.

W. F. Waugh, of Philadelphia, ¹⁹ in a paper on the "Specific Treatment of Typhoid Fever," spoke of his experience with sulphocarbolate of zinc in eight cases of undoubted typhoid fever, which led him to believe that this drug was of great value in this disease.

Ice-Bag.—Weichardt ⁸⁸ has employed an ice-bag wrapped in flannel and laid over the spleen in typhoid fever, and thinks that a

reduction of temperature and a hinderance in the development of bacilli resulted.

Alum.—Paoletti¹ has treated sixty cases of typhoid fever, with excellent results, with crude alum alone. This drug had formerly been used only as a styptic and an astringent, but now that its antiseptic properties had been recognized it was clearly indicated as a remedy for abnormal fermentations in the intestinal canal.

Strophanthus.—According to Poulet,¹¹³ and contrary to the existing supposition, strophanthus protects from haemorrhage, and occasionally acts as a purgative. It exercises no especial influence upon the frequency of the pulse in typhoid. In the initial stage one or two grains in pill are markedly antipyretic.

Leidy⁸⁰ says that in typhoid fever (1) *digitalis* reduces the pulse-rate, diminishes the respirations, and depresses the temperature; (2) that with a fall in the pulse and respirations there is a corresponding decline in the temperature; (3) that a weak heart is no contra-indication to its use; (4) that the main indication for its use is a weak heart, independent of hyperpyrexia; (5) that though a most powerful antipyretic in treatment of hyperpyrexia when associated with a weak heart, it should not be used to meet this indication when there are no evidences of cardiac weakness, *i.e.*, when the pulse is strong, full, and bounding.

Jaccoud²⁴ emphasizes the dangers of the employment of *sulphate of quinia* and of *salicylate of sodium* in the treatment of typhoid fever, pointing out the fact that among the seven recognized different forms of delirium which may be observed during the course of typhoid fever, there is one which it is most important to recognize and avoid, that is, the therapeutic delirium. This form may arise as a result of the administration of sulphate of quinia or salicylate of sodium in too large doses, or even with moderate doses if too long continued. These forms are: (1) initial delirium; (2) delirium of the period of development or typhoid delirium, properly so called; (3) delirium of inflammation, symptomatic of meningo-encephalic congestion; (4) alcohol delirium; (5) therapeutic delirium; (6) delirium of inanition at the time of defervescence; (7) late delirium, or the delirium of convalescence.

Jacobi⁵¹ points out the various sources of danger in typhoid fever in children, and reviews in a practical manner the best means of combating these dangers. The small intestine is affected prin-

cipally. After the first few days a considerable amount of food is required, and it must be so chosen as to be digestible in the stomach, its proper selection being the more important the more the function of the latter organ is impaired by high temperatures. Besides plenty of water, or acidulated water (hydrochloric [no organic] acid), albuminoids are indicated. Milk and cereals (in decoctions, which must be strained) are the proper foods. The administration of stimulants, both as to quantity and to time, depends on the character of the individual case and the power of resistance on the part of the patient, besides the condition of the heart. At no time during the disease and during the first ten days of fully established convalescence must the food ever be solid. No vegetables must be allowed until three weeks have elapsed from the beginning of apyrexia. When the milk and cereal foods become distasteful a change in their preparation will and must suffice. The large majority of relapses are due to a dereliction in the strict rules of feeding.

ENTERIC, OR TYPHOID, FEVER.

(From the ANNUAL for 1890.)

Etiology.—Vaughan ⁵⁹ has isolated from typhoid stools a ptomaine which, when administered to dogs, produced increase of temperature, vomiting, purging, with watery, mucous, and bloody stools.

An outbreak of enteric fever at Balranald, N. S. W., is attributed to the water-supply. ⁶⁰ Gebhart ²⁸³ lays stress, in his report on enteric fever in Buda-Pesth, on the diffusion of this disease by drinking-water. Cameron ² reports on a limited epidemic at Hendon traced to infected milk. The evidence as to how the milk became contaminated is not clear. Among other sources under suspicion is porcine pneumo-enteritis.

Charles V. Chapin ⁶⁹ reports on the epidemic of enteric fever in Providence, R. I., in its relation to the public water-supply. During the latter part of November, 1888, enteric fever began to increase quite rapidly and quite abruptly. The increase culminated December 1st, when 28 cases were reported, and the epidemic ceased, on December 12th, almost as suddenly as it began. There were 15 deaths in November, 47 in December, and 5 in January. The epidemic was confined to the city of Providence, and was pretty evenly distributed. It was found that typhoid had prevailed from August to December 1st at Natick, a village $3\frac{1}{2}$ miles (5 kilometres) above the pumping-station which supplies one of the reservoirs whence drinking-water is distributed to Providence. It had attacked some 20 persons living in tenements near the river. These people had been accustomed to throw slops and excrement on the banks of the stream, where they would be sure to wash in with a heavy rain, and might get in at other times. On November 9th and 10th there was a heavy rain. The city engineer calculates that three days might elapse between the time the infected water got into the pumps and the time it would reach consumers. Several filters were taken from houses where there was enteric fever and examined for bacilli. Two were examined by Prudden,

of New York, and typhoid bacilli found in one. Two were examined by Ernst, of Boston, and typhoid bacilli found in both. Two were examined by Swarts and typhoid bacilli found in neither. All observers found other organisms characteristic of human faeces. There can be little doubt that the epidemic described was due to infection by the public water-supply. What the author looks upon as a more frequent mode of infection is the following: The dried spores of the bacillus are carried here and there by the wind and other distributing agencies and take root in privy-vaults, cess-pools, swill-tubs, and other collections of decaying animal and vegetable matter. Some of these organisms find their way into the house and fall, perhaps, into the milk put in the cellar where it is cool, or upon cold potatoes on the pantry-shelf, only a few feet from an infected privy, or else, finding their way up the waste-pipe of a refrigerator which discharges upon the moist ground or into an open drain, multiply at leisure on the damp shelves, that are rarely washed or dried, and contaminate the food placed there. When this food is eaten without being cooked, the organisms sometimes escape the hostile action of the gastric juice and we have a case of enteric fever, which those who have paid little attention to bacteriology would quote as of *de novo* origin.

Anderson^{2 Aug. 11} reports a peculiar teat eruption in a milch-cow coincident with an outbreak of enteric fever among the consumers of the milk at Dundee. The case for infection by this cow disease is not proved. An outbreak of enteric fever at Leeds has been provisionally traced to two farms from which milk is supplied to the families of those attacked. ^{July 15}⁶

Milroy^{106 Apr.} traces the connection between enteric fever and water-supply in Omaha, and advocates stringent sanitary legislation, together with the closing of all wells used as sources of portable water.

Cluzan^{243 Apr.} reviews the epidemic of enteric fever which suddenly broke out in September, 1887, among one company (10th Artillery) of the garrison of Vernon, in all 22 cases developing in the course of fifteen days, of which 1 proved fatal by lobar pneumonia contracted at the beginning of convalescence. Two other companies inhabiting the same barracks were free from the disease. The sanitary conditions of the quarters and the rations supplied to all were alike. The artillery company, however, were engaged dur-

ing the day at an arsenal, and there drank water not used by the others. This water came from a stream flowing through the village of St. Marcel, where at the time enteric fever existed. The villages had no other water, and not only used it for drinking purposes, but washed their linen therein. It is certain that linen soiled by persons sick of enteric fever was washed in this brook. In 1883 enteric fever similarly appeared at Vernon, following an outbreak at St. Marcel, when the brook was abandoned as a water-supply, and water taken at the source brought in subterranean conduits, since which no cases of local origin had been seen there.

Passerat²¹¹ has carefully studied the epidemic of enteric fever which prevailed at Bourge-en-Bresse from November 29, 1888, to February 20, 1889. The bacillus of Eberth, which Chantemesse had failed to find in samples previously submitted to him, was later isolated and cultivated by Vaillard at Val de Grace, and its presence in the water of the Lent, the water distributed by the municipality throughout the town, thus proved beyond question. The water of the locality, on the other hand, was free from bacilli. Enteric fever was entirely absent from the charitable and educational establishments using the water of the locality, while at least 40 cases occurred in those establishments using the water of the Lent. Enteric fever had been a rare phenomenon in this place. During 1888, however, a number of sporadic cases had occurred, as if to warn them of the pollution of the water-supply and of the imminence of an epidemic. The epidemic exhibited three divisions. The first and most important was from the end of November to the 19th of December. The second, from January 1st to 15th. The last, quite mild, from February 15th to 20th. An interval of ten days, during which no new case was observed, separated the first outbreak from the second. One month elapsed between the second and third. The water of the Lent was distributed eight days before the outbreak of the first epidemic; again, December 25th to 27th, one week before the second outbreak; again, on the 14th of February, a mild disturbance was followed by 5 new cases. Passerat has collected 81 cases, somewhat less than the actual number. Of these 65 belonged to the first outbreak, 10 to the second, and 5 to the third. Fifty-four cases occurred among the civic population, 27 among the soldiers. Eight deaths occurred, 3 among the resident population and 5 among the floating population.

Shufelt⁵⁹ holds (1) that the poison spreads with greater rapidity and becomes more virulent in proportion to the amount of organic matter in the water and the soil; (2) that when the water-supply is infected with the poison, most of those drinking it suffer to a greater or less extent, though all may not develop the characteristic symptoms; (3) it is of the greatest importance that the disease should be recognized at its earliest stage, the source of the poison located, and both milk and water sterilized before being used. In support of these propositions, he instances three local epidemics, two of which occurred in Lower Canada and one at Bath Beach, L. I.

Hope, Assistant Medical Officer of Health at Liverpool,^{187 July} reports on some features of the local incidence of enteric fever. It has never prevailed in that city to any serious epidemic degree, yet it is nearly always present, and the deaths for the last ten years have averaged 129 annually. Liverpool, at the present day, may be regarded as a well-sewered city. In all new houses the laws provide for the efficient trapping off of the house-drain from the sewer and for appropriate ventilation. The "court-houses," some 12,000 in number, have no further internal drainage than that necessary for the removal of water used for domestic purposes, the closets being outside and flushed daily by scavengers. The courts produce their full quota of enteric fever. A number of instances of local outbreaks, traced to defective plumbing, are quoted; 3 series of cases are given, however, in which the sanitary condition of the house, after the most careful examination, was found to be perfectly satisfactory, and in which 1 case seems in each instance to have given rise to several others.

Von Pettenkofer^{1149; 22} has traced the history of typhoid fever in Munich, during the period from 1851 to 1887, showing the relation of its frequency with the sanitary condition of the city at the various stages of progress. During the years 1858 to 1880 there was a gradual diminution of disease in Echelon; that is to say that, although since 1857 there have been several epidemics of the disease, the epidemic of 1869 was a great improvement on that of 1857, and that of 1873 on that of 1869, and so on; so that it would appear that there was some influence for good at work from the first-mentioned date. He first of all gave statistics showing, among other things, the mortality per 100,000 of in-

habitants each year from typhoid. The figures are so eloquent that we cannot refrain from giving a few. These are:—

1851.	99	1870.	149
1852.	121	1871.	129
1853.	184	1872.	240
1854.	227	1873.	131
1855.	193	1874.	159
1856.	291	1875.	121
1857.	291	1876.	67
1858.	334	1877.	84
1859.	175	1878.	55
1860.	109	1879.	109
1861.	119	1880.	72
1862.	202	1881.	18
1863.	163	1882.	18
1864.	247	1883.	19
1865.	202	1884.	14
1866.	203	1885.	18
1867.	52	1886.	21
1868.	80	1887.	10
1869.	111		

From the mortality he estimates, by a simple and apparently reliable process, the morbidity and the loss to the community at large resulting from a preventable disease. He then goes on to consider the etiology, to which a considerable space is devoted, the various sanitary improvements that have been carried out, and to estimate the share of each in bringing about the desirable result that has been obtained. Respecting the drinking-water theory, he says that it is still the ruling one; that it is the nearest at hand; the simplest, the most easily understood, both by the laity and physicians; that it never leaves one in the lurch, for if there is no epidemic no germs have got into the drinking-water, and if one breaks out they have got in. Although the drinking-water theory does not satisfy him, as we shall see further on, he acknowledges that it has been productive of much good to the brewers, as people have been afraid to drink water, and have drunk beer to the value of 30 millions of marks per annum. He then gives the history of the introduction of pure water to the city, showing that the various parts got their supply at various times, and that absolutely no correspondence was shown between the date of supply and the diminution in frequency of the disease. Until 1865 the water-supply of Munich was exactly what it was in the cholera year, 1854, and scores of years before. In 1865 the Pettenkofer Brun-

nenhaus water was added, but this was not a general but only an increased supply to certain parts of the city, and the full supply of pure water was only instituted in 1883, some years, as will be seen by the table, after the great decline in typhoid fever had declared itself. The effect of improved methods of treatment and possible change of constitution among the inhabitants and the "saturation" theory come under review, but all are rejected as inconclusive and unsatisfactory. "After," he says, "I have discussed the things from which the decline of typhoid fever in Munich cannot come, it remains for me to speak of that from which, in my opinion, it really does arise. If epidemics do not arise from the individual cases, and not from the drinking-water into which the germs of disease may have found their way from the sick, Munich itself must be the breeding place. Typhoid, as well as cholera, not less than malaria or intermittent fever, shows a connection with locality and seasons, and as something can be accomplished as regards the frequency and severity of malaria by treating the soil itself, so also with cholera and typhoid." The soil of Munich is very porous, and the pollution of the soil of a city comes principally from human excrement and middens.

In 1854 it was ordered by the authorities of the city that in the case of all new erections the middens should be made water-tight, and that existing middens should also be made water-tight or done away with before the year 1860. Before this time middens were simply pits from which the fluid contents were absorbed by the soil. Many householders did not see the utility of spending money on making them water-tight. An otherwise intelligent man complained bitterly in von Pettenkofer's hearing on being obliged to make such changes. He had built a new house and had fulfilled the requirements of the law. Now, however, he had to put a similar arrangement into an old house, and yet the old midden was much better than that in the new one. The midden in the new house was running over in a couple of months and had to be cleaned out, whilst the old one had not required cleaning out for twenty years! The numerous water-cisterns were also done away with as much as possible. These regulations, although they left much to be wished for, showed their value in the next epidemic. A soil once polluted, even if not subjected to further pollution, requires a long time to get purified, but it gradually becomes

master of the impurities in it. Later on, it became more and more evident that no proper house-drainage was possible without a rational sewage system. The great value of this had been brilliantly shown in many English towns, and in Frankfort-on-the-Main, among German cities. After plans for a complete system of drainage had been drawn by an English engineer, Mr. Gordon, the work of sewerage was renewed, and from the years 1881 to 1887 48 kilometres of sewers were laid. In addition to these sanitary works, another of great importance was effected, viz., the erection of a new slaughter-house and a cattle-depot. This was opened in 1878, and at a stroke there was a disappearance from various parts of the city of 800 scattered private slaughter-houses, with all their inevitable accompaniments of filth and pollution. The city had not to wait long for evidences of the wisdom of exchanging a multitude of primitive slaughter-houses (1314) for one with proper sanitary appointments, as in 1881 the mortality from typhoid fever was reduced to 18 per 100,000. He illustrates the value of drainage and sewage by what occurred in a low part of the city, a quarter inhabited by 500 individuals. Previous to the sanitary works being carried out, this particular spot was noted as the hot-bed of typhoid fever and cholera. Since the introduction of water-tight middens, filling up of cisterns, and drainage, and without changing anything else, the spot has become absolutely free from these diseases, notwithstanding the fact that they still continue to drink from the same wells as before; while the same diseases continued as before in the nearest-lying parts of the city, although supplied with the best water, but where the old privy and midden system still prevailed, from every one of which the liquid pollution was greedily soaked up by a porous soil. He acknowledges that he cannot furnish a scientific explanation for the action of drainage and removal of filth any more than he can of the action of quinine, adding that one must reckon with facts which retain their practical value independent of any theory. Such a fact is that observed in Munich, that a sickly soil can be made healthy by certain technical treatment.

Von Ziemssen ¹¹⁴⁹ _{Jan. 17, 24; Feb. 16} ² has compared the morbidity with the mortality of enteric fever in Munich from 1866 to 1887, as a supplement to von Pettenkofer's inquiry into the reduction of mortality brought about by improved drainage. Before 1881 the

yearly average of enteric fever morbidity in hospitals was 594; for seven years subsequently it had been only 104, notwithstanding a great increase in population. Before the new system of drainage was introduced the hospital morbidity was 3.32 per 1000 of population; afterward, only 0.42 per 1000. The mortality from enteric fever in the whole city, from 1866 to 1880, amounted to 3118, with a yearly average of 208; but from 1881 to 1888 there were only 324 deaths from this disease,—a yearly average of only 40. The mortality per 1000 of population for the former period was 1.15; for the latter, 0.16. After all attending circumstances are fully considered, this great diminution in both morbidity and mortality is shown to be due to the improved drainage.

Von Ziemssen calculated the loss of earnings entailed by the morbidity from typhoid fever during the period 1866 to 1888, and the whole money loss, as far as could be calculated. It was not difficult to show that the loss was enormous and at first sight startling, and that the saving during the past eight years had been in proportion. He calculated that during the latter period, as compared with the preceding years, included in his tables, there has been a saving to the inhabitants at large of 2,946,000 marks; that is, if the morbidity had continued during these eight years at the same high rate as before, the loss of wages entailed by typhoid fever and the cost of feeding and attending the sick would have reached a total of over £18,000 per annum over the actual cost. In concluding his contribution, von Ziemssen considers the results already gained as regards typhoid fever as only part of the fruits of the great outlay that has been made. Not only is the nutrient soil taken away from typhoid fever, but the conditions for the epidemic development of cholera are removed with it, and that it will take decenniums to show all that has, from a hygienic point of view, been gained.

Augustus Caillé^{1,10} reviews the present condition of knowledge concerning the etiology of typhoid fever. He points out the fact that microscopical examination is insufficient for the purpose of diagnosis, potato cultures being necessary under all circumstances. When the clinical data are insufficient, the stools should not be used for cultures, seeing that they contain many varieties of bacilli. The examination of peripheral blood usually yields a negative result. He refers to the investigations of Lucatello, who made

successful inoculations in ten out of thirteen trials with the blood drawn from the spleen by means of a Pravaz syringe. Blood drawn from the *taches rouges* has given a positive result in 50 per cent. of the cases. Bacteriological examinations are of little value as a preliminary procedure, seeing that they consume several days, while the clinical diagnosis may usually be made in the same length of time.

Edson⁵⁹ has carefully studied the etiology of enteric fever communicated to a number of new cases, in which the mode of propagation was evident. He concludes that typhoid fever never infects the atmosphere, that typhoid fever never arises *de novo*, and that the causes of the disease in the order of their frequency are as follow: 1. Infected water. 2. Infected milk. 3. Infected ice. 4. Digital infection. 5. Infected meat.

Hamilton¹¹⁴⁷; ² _{Mar. 22} states that the day has gone by when it is needful to argue that enteric fever exists in India. The heavy mortality among British officers and soldiers is a matter of grave moment. "Recent arrival" and "youth" are the principal predisposing factors. In the first and second years of residence the percentage of liability is 64.12; in the third and fourth years, 24.9; from the seventh to tenth it drops to 8.52. Under 25 years of age it is 63.05; from 25 to 29 years, 26.10; and from 30 to 34 years, 8.65. The diet is too stimulating for the hot weather. The same observer²⁰⁶ _{July} reiterates the opinion that the disease is prevalent among the natives and is conveyed to the troops, despite local sanitary precautions, by contaminated milk, "pop," water, and other beverages. He recommends stringent legislation with punitive provisions.

Roberts²⁰⁶ _{June} has published an interesting note on the occurrence in dogs of lesions resembling those of enteric fever in the human subject. Roberts suggests that if further examinations should prove that dogs, as he suspects, are liable to typhoid fever, that fact would help to explain the continued prevalence of the disease in Indian cantonments, in spite of the sanitary precautions taken.

Harley,⁶ _{Apr. 18, 27, May 11} in his Lumleian lectures, discredits the germ theory of disease, believing that too little attention has been given to the following points: First, the superabundant vitality of the healthy body, which is liable to the invasions of micro-organisms only when depression has already brought it to a condition very near extinction. Second, the time necessary for the development

of micro-organisms, which can therefore have no part in the sudden transitions from health to disease sometimes witnessed. Third, the introduction of the animal medium as well as the germ in inoculation. Fourth, the fact that in cultures outside of the body the micro-organisms are the outcome of chances in the albuminous medium. [The author should have said that the *growth* of the micro-organisms is *correlated* with changes in the medium. As it stands, the proposition savors of "spontaneous generation," which he cannot intend.] He looks upon enteric fever as an effect of derangement of function. Two causes co-operate in the production of disease,—variation in environment and diminution of oxidation within the organism. He denies the contagious (infectious?) nature of the disease, and holds that a chilling or wetting is sufficient to determine congestion of the intestines, with resultant enteritis and the phenomena of enteric fever.

The intimate relation between ague and enteric fever has always been forced upon the attention of military medical men, and great difficulty in classification has sometimes arisen. He cites cases to show the dependence of ague upon impure drinking-water, not necessarily of a specifically toxic character, and the development of enteric fever from ague. The daily rise and fall of temperature in enteric fever he considers a proof of its intermittent character. The continuous fever is a conversion of repeated paroxysms into a febrile vibration. Ague brings about arrest of cutaneous function and congestion of internal organs; hence, pyrexia. At first liver and spleen are stimulated, but when the temperature rises to 104° F. (40° C.) there is arrest of function. The intestines and lungs become laden with blood, and the lymphatic tissue of the former, being the most vascular, suffers most. This congestion, with irritation from imperfectly-digested faecal matter, brings about excoriation and ulceration.

The lesions of enteric fever may be produced without specific infection in a still larger class of cases: those of simple diarrhoea and dysentery, in which internal congestion is relieved by a copious exudation from the intestinal mucous membrane. He relates his own case of simple apyrexial diarrhoea, with motions resembling those of enteric fever. Seakale eaten sixty hours before, a fresh egg eaten forty-eight hours before, a post-mortem odor inspired three days before,—in other words, too much sulphur,—he looks

upon as the cause. The irritation caused by the stools might, if sufficiently prolonged, set up inflammation of the intestinal glandulæ.

Sewer-gas plays an important part in the production of enteric fever. In ordinary cases the intoxication is a slow one, increasing under the prevalence of the cause from day to day until a point is reached where health is overcome. In the case of a person who, superintending the opening of a blocked drain, is overcome by the stench, sickens and dies, we see the effects of a rapid intoxication. It is probable that the putrid exhalations are locked up in the haemoglobin, and possibly do no more harm than results from displacement of oxygen. It may be liberated, unchanged, probably in the liver; but in the more-profound intoxications either it is not displaced or, in the process of liberation, does more mischief. Milk is often, and rightly, credited with the production of enteric fever. Not only when putrefactive changes have commenced, but even when fresh, it may do harm owing to some derangement in the health of the cow. "None but savages should take it raw."

The records of the War of the Rebellion are quoted to prove the relationship between ague and enteric fever ("typho-malarial fever"), and also that between enteric fever and simple diarrhoea and dysentery. The circumstances under which outbreaks occurred, the facts of their progress and termination are analyzed, and the conclusion reached that the origin, progress, and termination of all are coincident and identical, dysentery being a slight modification or variation—sometimes one, sometimes the other—of the more or less general enteritis which is described as acute and chronic diarrhoea and enteric fever.

Rachford⁹ has made an instructive study of the toxic effects on animals of the ptomaines produced by the action of the typhoid bacillus on various articles of diet. He injected into rabbits' stomachs the whole culture, containing the active bacilli as well as the products of their growth, fearing to destroy or change the character of the ptomaines if he attempted to destroy the germs by heat or otherwise. One of the rabbits, however, seems to have died from typhoid fever and not from ptomaine poisoning. The food-stuffs used were: 1. Peptonized milk. 2. Peptonized beef. 3. Peptonized brain. 4. Bouillon and beef peptonoids. He concludes that the ptomaines formed in peptonized beef and

brain and the beef peptonoids of the shops produce profound nervous symptoms including stupor, the former producing no fever, however, and being less virulent than the latter. The ptomaines produced in milk cause neither stupor nor fever. His experiments thus accord with clinical experience that milk is the best diet in enteric fever.

Lavrand²²⁰ _{May 20} reports a number of cases in support of the view that enteric fever may be communicated by direct or immediate contagion. Valentini⁴ _{No. 17, July}³⁶ thinks it likely, though not yet proved, that relapse of enteric fever is due not so much to new infection as to isolated colonies of the bacillus remaining capable of reproduction in the parenchyma of organs or in the bowel, and which, in consequence of trifling, injurious influences, penetrate into the circulation and bring about a general infection. Fraenkel has demonstrated the bacillus, 147 days after the beginning of the fever, in the pus of an encapsulated peritonitic abscess. Valentini relates similar experiences with abscess on the left shin and empyema.

The Association of Enteric Fever with Other Infections.—Karlinsky⁴ _{No. 43, 1885} reports a case of typhoid fever in which, three weeks after onset, bacilli, which the author regards as anthrax bacilli, were found in the stools. These organisms were nine μ long, and occurred both singly and arranged in chains of two or three links. In bouillon cultures, as many as five to ten links were connected. In some of the bacilli spores were seen. Subcutaneous injection of these bacilli killed young rabbits within two days. In the lymph of the animals, as also in the blood-vessels of the liver, the author found the same bacilli in large quantities. Other bacilli of similar size, together with streptococci, were found in the faeces. The patient died about the thirtieth day from the beginning of the illness. The lower ileum and cæcum showed the characteristic lesions of enteric fever, while in the stomach and elsewhere in the small intestine were changes such as are occasionally seen in milz-brand. In the blood of the liver, the splenic veins, the veins on the surface of the stomach, and in the juice scraped from the spleen, anthrax bacilli were found in abundance. Typical colonies developed upon gelatin and agar cultures. The liver, the intestinal wall, and some of the mesenteric glands contained great numbers of the bacilli, whilst in the ulcers of the lower ileum and cæcum typhoid bacilli were found. The author ascribes the anthrax

infection to the fact that the patient had, upon the twentieth day of his illness, partaken of milk which was found upon investigation to have come from a cow infected with anthrax.

Holmes²² _{Jan. 16} reviews the subject of secondary mixed infection in enteric fever with special reference to the development of complications. He points out the fact that the infection by the typhoid bacillus is followed by a definite train of symptoms which does not include suppuration. Many of the graver phenomena of the disease are due to infection by other bacteria, which have no essential, but only an accidental, relation with enteric fever itself. The invasion of the typhoid bacillus, however, produces changes in the lymph-glands and the intestinal and respiratory tract which lead to great diminution in their powers of resistance; hence, secondary invasion by pathogenic and other bacteria becomes an easy thing. Many of the pathogenic bacteria are only facultative parasites of man, living, for the most part, as messmates with him on the contents of his intestines, or, as some think, being necessary to mammalian digestion. When the intestine or any part of it dies, or the barriers which chance or association have thrown up are torn down by traumatism, or otherwise, the before harmless or even helpful bacteria set up a destructive, saprophytic colonization of the tissue of their host, and produce in the neighboring living tissues suppuration, coagulation-necrosis, haemorrhagic infiltration, lymphatic engorgement, or any of the results which are so frequently demonstrated in the infectious diseases, the nature of the lesion being dependent, of course, on the peculiar anatomy and physiology of the invading parasite. The most important of these pathogenic bacteria is the pus-microbe, both on account of its very general distribution and on account of the changes which it produces. The engorged and infected Peyer's gland is very soon attacked by suppurative bacteria. Ulceration and sloughing follow. The micrococci are carried on into the mesenteric glands, where they may, in favorable cases, be arrested and destroyed. This fortunate issue is not always realized. The filtering power of the gland is overcome and the great lymphatic channels are flooded with escaping bacteria; hence result infarcts and lesions of the mediastinal glands, infection of the bones, joints, and other cavities and larger organs of the body. The bacteria of suppuration circulate freely in the blood until they are arrested by the arterial capillaries and are removed by

the lymphatic apparatus. In certain cases, however, pus formation takes place in all parts of the body. The bacteria not only multiply in definite patches, but even in the circulating blood itself. The author believes that extensive destruction of the walls of the intestines leading to perforation is due to the local activity of the pus-microbe rather than of the bacillus typhosus. The same holds true of the walls of the blood-vessels and the intestinal haemorrhage produced by their local destruction. If the eroded vessel be a vein, the septic bacteria may be carried into the portal circulation and set up suppuration in the liver. Local abrasions of the skin make way for the infection of erysipelas. Tetanus also makes its way through the abraded skin or the intestinal mucous membrane.

That a specific infection is the cause of the disease which Ceci terms haemorrhagic infiltration is now well demonstrated. This is the secondary infection which causes the uncontrollable epistaxis in diphtheria. The author thinks that there is no doubt that the same form of infection is responsible not only for the epistaxis of typhoid, but also for a great many cases of diffuse intestinal haemorrhages and haemorrhages from the stomach and colon. Noma, a malignant oedema, and diphtheria present no anomalies in their appearance in typhoid. The frequency of tuberculosis following enteric fever is to be explained by the low state of vitality to which the patient is reduced and the tardiness of the convalescence. Latent tuberculous spores in old glandular foci or in cicatrices of the lungs vegetate again, and at the same time the condition of the patient exposes him peculiarly to fresh infection from tuberculous nurses, patients, or food. The following practical conclusions are theoretically justified, and may be provisionally supported: The local effects of an invasion with the typhoid bacillus is a non-destructive one, and the tendency is toward complete restitution to a state of health. The primary lesion in the bowel or in the larynx gives rise to a point of least resistance, and the general impairment of nutrition renders all the causes which ordinarily determine the localization of infection far more potent. Pyogenic and other forms of infection do take place through the primary lesion, and result in more than ordinarily serious consequences on account of the diminished resistance of all tissues of the body. Therefore, all traumatism to the abdomen, either external (through violent, careless, or unnecessary palpation) or internal (through the use of

food containing solid particles which might cause abrasion), should be strenuously avoided, and the patient should be in a position of most complete rest.

The imminent danger of typhoids to tuberculosis is conceded by all, and every caution should be taken to prevent infection through contact with phthisical patients or nurses, or through confinement in rooms occupied by them, or through utensils of food which might furnish the infection; and, where there is reason to suspect latent tuberculosis, the use of all antitubercular measures is recommended. The treatment of typhoids and phthisical patients in the same hospital-wards is little short of criminal, and the employment of tubercular nurses, attendants, or cooks, or ward-servants, is incompatible with the present state of our knowledge of tubercular etiology. As typhoids are more than ordinarily susceptible to all contagious diseases, they should be rigorously excluded from direct and indirect contact with diphtheria, erysipelas, and all wound diseases; the most thorough cleanliness should be observed about the person, and the towels, bedding, and utensils should be beyond reproach. In the care of the lips, the tongue, and the nose, care should be taken that no abrasions be made which might open a way to secondary invasion. So-called relapses are often due to a secondary mixed infection. Therefore, in all cases of relapse careful, diligent, and, if necessary, repeated search should be made for food or infection which could give rise to the symptoms of relapse or any anomaly of temperature. When a localization of infection has been discovered, the fact that the patient is, or has been, suffering from typhoid does not interdict the employment of ordinary surgical principles, but furnishes an additional and imperative indication for speedy operative interference, as furnishing the only known means for preventing the most disastrous issue.

Pathology.—Janowsky¹¹³ Ap.7 considers the long-continued form of enteric fever to be a series of relapses due to successive re-infections. Even where there is no febrile interval, it will be observed that there is a secondary fever curve, beginning before the first has been completed. The first may be greater than the second, or the reverse may obtain. If it be further observed that the secondary infection may occur just at the acme of the development of the first, all doubts concerning the true nature of the long-continued cases will be resolved. Clinically, each new infection is manifested

by new temperature curves, increased severity of typhoidal symptoms, greater enlargement of liver and spleen, fresh crops of rose-spots. Anatomically, there is swelling of the solitary follicles and Peyer's patches, which explains how at autopsies there may be found fresh enlargements of the solitary follicles and fresh infiltrations of Peyer's patches in the neighborhood of cicatrized ulcerations.

Schmidt ³² ₁₈₈₂₋₈₆ has made a study of relapses in enteric fever based on the material furnished by the clinic of Wagner, 1882 to 1886; 561 cases gave 49 relapses. A relapse is defined to be a fresh outbreak after the primary attack has run its course. It is distinguished from a recrudescence by following the original attack after an interval of not less than twenty-four hours, during which temperature is within normal limits and there are no febrile symptoms. Relapses and recrudescence are identical when looked at from the stand-point of pathological anatomy, but clinically it is convenient to draw a distinction between them on account of the severity and relatively high mortality in recrudescence and for etiological and other reasons. Schmidt adopts Ziemssen's test, which requires two of the three cardinal symptoms, step-like temperature-chart, roseola, enlarged spleen, to settle the diagnosis. Omitting the cases which do not satisfy Ziemssen's criterion, we have 38 relapses in 561 cases of enteric. This gives a percentage of 6.8, which agrees with the results of German authorities. Thus, Gerhardt obtained a percentage of 6.3 from 4000 cases selected from various epidemics. Human's percentage is 6.5 and Steinthal's 7.5. No doubt, as the author remarks, the proportion of relapses varies with the locality and the epidemic as well as with the observer. Murchison's low percentage (3) is partly explained by his attaching too great importance to the rose-spots.

From an analysis of his 38 cases of undoubted relapses, Schmidt obtains the following results: The duration of the relapse varied from six to twenty-two days, the mean duration being 12.8 days. Twenty-four of the cases began with a step-like rise of temperature. In the 14 remaining cases the temperature rose from 39.5° C. to 40° C. (103° to 104° F.) in from twelve to thirty-six hours after the onset, and 1 case began with a rigor.

The cases which had an acute onset resembled also, in their relatively short course, abortive typhoid, in the sense in which Liebermeister uses the term. There was a roseola in every one

of the 14 cases; in 8 of them the spleen could be distinctly felt; in 4, severe bronchitis; in 5, enteric stools; in 1, ordinary diarrhoea, and in 8 the motions were formed and constipation frequent. In only 3 of the 24 cases were there characteristic enteric stools. The spleen was enlarged in 21 and there was an eruption in 14. Often the patients felt quite comfortable. In 25 of the relapses the eruption was carefully noted. In 2 it appeared on the first day, and in 18 between the third and the seventh day. In 4 cases the apyretic interval which separated the relapse from the original attack was only one day, in 4 it was three days, in half the cases not more than a week, and in only 3 over a fortnight.

Respecting the etiology of relapses, our author concludes, from his own cases, and from a careful examination of the experience of others: 1. That the occurrence of relapses in enteric depends on the character of the epidemic—in other words, on peculiarities of the virus. 2. Gross outbreak of relapses. 3. Severe primary attacks are less likely to be followed by relapses than mild and moderate attacks. 4. Individual idiosyncrasy is probably of no importance. 5. The influence of treatment in causing relapses is doubtful.

Jaccoud²¹² considers relapses much more frequent in enteric fever than is usually believed. He has seen more than 60 cases,—between 9 and 10 per cent. of his personal statistics. Certain authors consider the treatment by cold bathing likely to increase the number of relapses. Jaccoud's statistics, which refer to a different plan of treatment, show a larger proportion of relapses, however, than have been cited in connection with the method of Brand. Contrary to the opinion that relapses supervene upon an incomplete primary attack, Jaccoud's statistics show the first attack to have lasted twenty-eight days or more. The duration of the afebrile interval is quite important from a practical point of view. In most instances it was from five to seven days; in other, quite numerous, cases it was prolonged to ten days, and in two exceptional instances the relapse occurred twenty and twenty-nine days, respectively, after complete defervescence. In other cases the interval was singularly abridged, fever recurring in two days or even in less than twenty-four hours. In the majority of cases the temperature reached a height equal to or exceeding that of the primary fever. The duration of the relapse, ordinarily, was from

seven to ten days, sometimes two weeks, exceptionally, or was prolonged to eighteen and twenty-one days. On the other hand, in some cases it was as brief as five days. From this fact the author concludes that the theory of a second infection is untenable. In 64 cases there was no death. Two and three successive relapses have been noted in some cases.

Relapse occurred in 21 cases out of 129 studied by F. C. Shattuck ⁹⁹_{Sept. 5} (16.28 per cent.). In 1 case was a second relapse. The author adopts Irvine's distinction between relapse (denotative of renewal of the complete typhoid process), whether intercurrent or consecutive, and recrudescence (renewal of pyrexia, more or less transitory). In 11 instances the relapse began before, and in the same number after, complete defervescence. In the 11 intercurrent cases the renewal of the process appeared to take place from the third to the fifth week. In the consecutive cases the apyretic interval was 1 day in 2 cases, 2 days in 4 cases, 3 days in 1 case, 6 days in 1 case, 8 days in 2 cases, 9 days in 1 case. The duration of the second attack varied from 11 days to 29 days, with an average of 19 days. The single death was in a consecutive attack. The maximum of the temperature curve was reached on the fourth to sixth day in 18 cases, on the fifth day more often than any other (8 cases). Treatment was expectant. In 38 cases (29 per cent.) no drug and no alcohol was used at any time in the course of the disease.

Handford ⁶_{Aug. 24} believes the visceral lesions recurring in enteric fever to be due chiefly to high temperature, septic organisms, and typhoid organisms (if such were present, of which he had not yet convinced himself). In all his cases the lesion described pointed rather to what had been called mixed infection. He had noted that organisms passing through certain individuals appeared to have had their virulence increased, while in others it was diminished, this being especially true in cases of what might be called diarrhœa resulting from the inhalation or ingestion of micro-organisms. He described in detail the changes in the stomach and intestines, including minute infiltrations, small ulcers, etc. In the lung he met with a special form of pneumonia, which, though lobular in its distribution, was croupous or exudative in character. There were also marked interstitial changes. This form of lesion appeared to be rapidly followed by death, and it seemed to be due to actual septic infection. In the heart there was degeneration of

the muscular fibres, associated with more or less interstitial change. In the liver he had frequently demonstrated the presence of an interlobular infiltration of small round cells, which eventually became converted into fibrous tissue. This would explain those cases of non-alcoholic cirrhosis met with especially in children. There were usually found also cloudy swelling and fatty degeneration of the liver-cells, and in some cases these changes were due more or less directly to the presence of some septic organisms, although there might be no abscess formation. The most marked changes in the kidney were interstitial and glomerular nephritis.

L. H. Cohin ¹⁹⁹_{Sept. 12} has published a thesis in which he sets forth the daily variations in the weights of patients in typhoid fever. The conclusions of his studies are as follow: 1. Typhoid fever presents two distinct periods, one of loss and one of gain; certain accidental causes may modify them, but cannot affect their general character. 2. The daily loss is due to febrile combustion, chiefly, and but little to abstinence. 3. The daily loss varies with individuals. 4. The losses in nitrogen and in weight are almost parallel with the march of the temperature, without always following it exactly. 5. The study of the weight-chart may aid in prognosis, a continual rise in the weight being a sign of convalescence. 6. The complications of the disease augment the loss of weight. 7. The study of the loss of weight enables the physician to determine with precision the action of nutritive substances in fevers. 8. The loss of weight in a typhoid patient takes place each day in a uniform manner.

Lafleur ²⁸²_{May} exhibited specimens showing a universal plastic peritonitis complicating enteric fever. The adhesions were firmest about the liver and spleen, those between the coils of intestines being quite recent. The capsule of the liver was much thickened, and the organ itself smooth and diminished in size and weight. On section the surface was rough, of a tawny color, and traversed by bands of fibrous tissue, most abundant near the capsule. Microscopic examination showed great thickening of the capsule, with irradiation of fibrous septa inclosing islands of liver-tissue, which were more or less atrophied. The central veins of the lobules were somewhat dilated and the adjacent cells atrophied. Both auricle and ventricle of the right heart were dilated, the muscle showing fatty degeneration.

Complications and Sequelæ.—Landgraf¹⁰ reports on the laryngeal conditions in 166 cases of enteric fever. In a great number, including many fatal cases, no pathological alteration was observed at any time. The most frequent lesion was so-called catarrh, a condition associated with poor local nutrition and epithelial erosion. Subjective and objective symptoms, other than those furnished by laryngoscopic examination, were lacking. Edema is a serious complication, but he attaches little prognostic importance to the marginal ulcers sometimes seen, especially on the epiglottis. They had healed even in fatal cases. Other deeper ulcerations, which occurred not only on the epiglottis, but within the larynx, might be complicated with perichondritis, and were of grave import. The rarest lesions were ulcers which, from the time of their appearance, the infiltration of their bases, and the undermining of their edges, must be considered specific typhoidal lesions. Three cases of perichondritis were observed, all arytenoidal and following ulceration. Two cases of muscular paralysis occurred during convalescence.

Lewy¹⁵⁸ _{110, 112, 113} reports a fatal case of laryngotyphus in a child aged 1 year. Death occurred on the eighth day. Autopsy showed the intestinal lesions of enteric fever, with fibrinous laryngitis, fibrinous pneumonia, and hyperplasia of the spleen. A fatal case of necrosis of the two arytenoid cartilages in a male, aged 18, during typhoid fever, is reported by Souques.⁷ _{116, 117, 118}

Stolterfoth⁶ observed in the Chester General Infirmary the following interesting case: M. R., aged 7, admitted on December 19, 1888, having been ill at home for fourteen days before admission. Two sisters and a brother had been admitted two days previously. There was a marked eruption on the abdomen and back; typical stools, but no diarrhoea; marked prostration, with considerable nocturnal delirium. Temperature, 102.8° F. (39.33° C.); respiration, 28; pulse, 120. The case progressed favorably till December 31st, when there was a strong attack of haemorrhage, half a pint of blood being lost. This was treated by ergotine and opium, with ice externally. January 2d, 1889, haemorrhage again occurred, but not so profuse as before. January 6th, a small strumous ulcer on the left middle finger became inflamed, and was rapidly followed by cellulitis of the forearm with free suppuration. Treated by free incisions and boracic fomentations.

On January 21st the respiration was difficult and stridulous, and, in spite of the treatment pursued, progressed to such an extent that on February 14th suffocation was imminent. The larynx, which was examined with great difficulty, was found to be much swollen and oedematous, and some small superficial ulcers were seen on the vocal cords. Tracheotomy was performed under chloroform, and the patient rapidly improved. On the fourth day the tube was removed, but had to be replaced on the sixth, owing to a return of the former symptoms. On the eighth day the tube was permanently removed. On the twentieth day the wound was quite healed, and the patient practically well.

Harrison^{6 Nov. 18} records a case of cellulitis of the neck, spreading to the apex of the lung, following enteric fever in a military recruit. The patient had been the subject of two relapses. The last relapse subsided February 16th. On April 20th he was able to be up all day. May 5th he complained of sore throat, and the tonsils were observed to be swollen. During the night difficulty of respiration supervened, probably from laryngeal obstruction. The tissues of the neck and throat were oedematous and infiltrated. Swallowing became impossible. Febrile reaction was marked. Relief was given by division of the tissues in the middle line of the neck, in the interval between the jaw and hyoid bone. Later, another deep incision was made behind the upper portion of the sterno-mastoid. Apex pneumonia supervened, and was appropriately treated. Recovery took place.

Snow^{112 Feb.} reports a case of enteric fever, with double suppurative parotitis, in which recovery took place. Hue^{203 Mar. 1} reports a case of profuse vomiting of coffee-ground-colored blood, at the onset of enteric fever, in a well-preserved man aged 69 years. In the course of three days the haematemesis recurred. There was also at times bleeding from the gums and haematuria, the patient presenting an exsanguine appearance. Fever oscillated between 38° and 39° C. (100.4° and 101.2° F.). The symptoms lasted four weeks before convalescence was established; relapse occurred and lasted fifteen days, after which recovery progressed rapidly. There was no personal or family history of haemophilia. Hue is sure of his diagnosis. Buffet has observed a similar case, but his patient was a gouty subject. Neely^{186 June} records a case of fatal haemorrhage in a farmer, aged 25 years, beginning on the twenty-second day

of enteric fever and continuing for forty-eight hours. Complete deservescence had taken place on the twenty-first day. Bleeding took place from nose, urinary passages, and bowels, and there were effusions into the skin. The epistaxis was uncontrollable, despite plugging and injections of Monsell's solution. The author attributes the complication to the too free use of ammonium nitrate, of which 5 grains (32 centigrammes) had been given every five hours for sixteen days. In addition, 15 grains (1 gramme) of quinine had been given every morning and evening. There was no family history of haemophilia nor any previous haemorrhagic tendency of the individual. Ebermaier ³²⁶_{B.M.H.2; Apr. 11} was able, in 2 cases of periostitis, occurring as a complication of enteric fever, to prove the presence of the typhoid bacilli in the pus and blood present. In neither were any other micro-organisms found. The author gives 6 other cases of periostitis occurring during the course of enteric fever, one of which went on to suppuration, the pus of which, however, was not examined bacteriologically; but he thinks that the results obtained from the first two cases allow us to consider the typhoid bacilli as the causative agent. He considers that the bacilli reach the periosteum from the medullary part of the bone through the Haversian canals, and is led to this belief from having obtained cultures of the typhoid bacilli from the medullary part of a rib removed post-mortem from a fatal case of enteric fever.

R. P. Long ⁹⁹_{Jan. 31} reports a case of gangrene of the left leg, extending to the upper third of the thigh, following enteric fever. Amputation was done and recovery ensued. The patient was a female factory operative aged 17 years. There was no evidence of any cardiac valvular lesion, so that the arterial occlusion is attributed to obliterating arteritis of the left femoral. Koehn ²³¹_{Apr.} reports a case of moist gangrene of left leg occurring during an attack of enteric fever in a male patient, aged 29, treated with antipyrin. Amputation was performed at the middle third of the thigh on the afternoon of the twenty-third day of the disease. Death occurred twenty-four hours later. Post-mortem examination was refused.

Leclerc reports a case of enteric fever contracted in Algeria in the course of which, in the author's opinion, malarial infection seems to have occurred, giving rise to an intermittent, febrile type.

Phlegmasia alba dolens occurred on the twenty-sixth day, and prolonged the case another twenty-six days before recovery took place. The treatment by cold baths was suspended on the supervention of this accident, but nine days afterward was resumed (though modified to progressive cooling) on account of renewed high fever,—41.4° C. (106.5° F.). Embolism, which might have been feared as a result of the baths, did not occur.

De Souza Martius²¹⁸ _{June} reports 3 cases of recovery after perforation in enteric fever, these being, as far as he knew, the only instances on record in Portugal. The patients were all foreigners. Treatment consisted of morphine internally, ice to the abdomen, and iced milk and champagne to drink. Branson⁶ _{Nov. 1} reports a case of perforation, with peritonitis, followed by recovery under opium treatment, in a professional nurse aged 26 years. The perforation, which was attributed to indiscretion in diet, apparently took place between the twenty-sixth and thirtieth days of the disease. On the thirty-eighth and succeeding days a number of foul-smelling sloughs were passed by the stools, one, passed on the fortieth day, being fully six inches (15 centimetres) long by $\frac{1}{2}$ inch (13 millimetres) in diameter.

Minich⁶⁰ _{Feb. 16} reports 6 fatal cases of pneumonia complicating enteric fever in which the affected lung was that of the side nearest the window. He does not now permit the side of the bed to be parallel with the window-wall, and has had no pneumonia since the change.

Hall⁹⁹ _{Sept. 26} analyzes 108 cases of enteric fever which were seen during six years' practice in Colorado. The mortality was 7.4 per cent. There were 6 cases of intestinal haemorrhage, 3 fatal. Several lung complications were noted in 11 cases, 4 fatal. One woman was confined at term without serious symptoms; another, four months advanced, carried the child through with safety. Five cases relapsed, 1 proving fatal. Three cases of lymphangitis of the leg occurred, 1 fatal. The tissues in the neighborhood of the sublingual parotid gland inflamed and sloughed in a strumous girl of 8 years. The destruction involved the whole anterior part of the cheek, causing death from haemorrhage.

F. C. Shattuck⁹⁹ _{Sept. 26} analyzes 129 cases of enteric fever treated in hospital. The total mortality was 8.37 per cent. Haemorrhage occurred in 2 of the fatal cases, Cheyne-Stokes respiration in 2,

broncho-pneumonia in 2, pericarditis in 1, general convulsions in 1. One death took place during a relapse, the patient being 54 years of age. Diarrhoea occurred in 25 per cent. of the cases, constipation in 36 per cent., occasional looseness in 24 per cent., regular motions in 15 per cent. Splenic enlargement was noted in 78.5 per cent. Among complications we note venous thrombosis (femoral), 7 per cent.; periostitis, 2 cases; lobar pneumonia, 2 cases; melancholia, 1 case; hemiplegia (embolic, early), 1 case; neuritis, 2.3 per cent.

Sudden Death in Enteric Fever.—Latil³⁵ reports a case of rapid death from bulbar paralysis following enteric fever. The patient was a woman of 42 years. The fever was grave from the outset, both on account of hyperpyrexia and the quick and extreme prostration. Nervous phenomena, such as agitation and delirium, were not sufficiently marked to deserve special note. Paralysis of the bladder occurred on the eighteenth day. Pulmonary complication, manifesting in the fourth week, prolonged the case, and on the forty-first day the temperature oscillated between 37° C. (98.6° F.) and 38° C. (100.4° F.). On the forty-second day the author noted a complete contracture of the masseters, not, however, absolutely preventing opening of the mouth. She swallowed liquids without difficulty. Voice was somewhat nasal in tone. There was no other contracture of head- or neck- muscles, nor strabismus. Temperature was 37.60° C. (99.7° F.); general condition good. Toward afternoon trismus became more marked, dysphagia developed, the nasal quality of the voice became more pronounced, and a few drops of liquid, taken with great pain, were regurgitated through the nose. Pulse was 120 and irregular; temperature, 39° C. (102.2° F.). Respiration was short and somewhat rapid, the patient complaining of oppression and manifesting great anxiety. Auscultation revealed at the base of both lungs the sibilant and mucous râles that had existed for some time. The heart-beats were quickened but feeble, the sounds muffled and presenting the characters of the foetal bruit described by Huchard. The patient grew rapidly worse, asphyxia was manifest at midnight, and death occurred the next morning. The author briefly reviews some of the literature of the subject, and leaves us in doubt whether he considers the lesion in his case to have been central or a peripheral neuritis.

Libouroux³⁶³ _{Mar. 5} reports a case of sudden death during the third week of enteric fever, in which the autopsy showed a small haemorrhage in the floor of the fourth ventricle, attributed to rupture of capillaries. Nothing pathological was discovered in the heart. McPhedran⁹ _{May 4} reports a case of sudden death in enteric fever, from heart failure. The patient was a laborer, aged 32 years. At the autopsy, ulcers in lowest 20 inches of ileum indicated the end of second week of disease. Mesenteric gland near ileo-cæcal valve very large and diffused. Solitary glands in cæcum, ascending and transverse colon enlarged, but not ulcerated. Kidneys healthy. Lungs: some old pleuritic adhesions; slight œdema at right apex; venous congestion posteriorly, bilateral, probably *post-mortem*. Heart: right auricle greatly distended, with recent black clot; right ventricle considerably distended; left side of heart contained a little blood; ventricular wall not contracted. Brain not examined.

The author considers that the explanation of the case is to be found, according to the theory of McWilliam, in the cardiac delirium resulting from the prolonged disturbance of nutrition due to the fever.

Hutchinson¹¹² _{Jan.} reviews the sequelæ of enteric fever as they affect (1) the nervous system; (2) the circulatory system; (3) the respiratory system; (4) the digestive system; (5) the genito-urinary system; (6) the skin, etc. Among personal cases he relates one of diabetes occurring in a lady 40 years of age. During the fever her urine was normal. Convalescence was tedious, and protracted by a succession of boils, which led to re-examination of the urine, and to the detection of sugar in it. Her mother died of diabetes at an advanced age.

“*Post-Typhoid Paralyses*” is the title of an interesting paper by Kebler.⁵³ _{July 18} He reports 2 cases. In one, about a week after convalescence, there occurred diplopia; dysphagia, with regurgitation of fluids through the nose; ataxia, paresis of arms and legs, with absence of reflexes. Anæsthesia over the affected parts was marked. Gradual improvement took place. The other case, three days after discharge, suffered with shooting pains in both legs, followed by marked paresis, with slight anæsthesia, the gait being ataxic. Temperature, 100° F. (37.77° C.); patellar reflex preserved. On the eighth day the temperature was normal; paresis

increased; knee-jerk absent. On the eighteenth day patient was again discharged, with only slight paresis remaining. Complete recovery has since been reached.

Zenner spoke of the case of a man, 32 years of age, in whom hemiplegia came on during convalescence from typhoid fever and remained permanently. Here there can be no doubt of a vascular lesion in the brain, probably occlusion.

De Beck referred to the pupillary conditions in Kebler's case as a point of discrimination from post-diphtheritic ophthalmoplegia. The pupil was dilated *ad maximum*. It contracted at first when light was concentrated upon it, but, while still under illumination, again relaxed to a moderate dilatation.

Kästenbaum ^{Aug. 22}⁸ has studied the nervous disorders which occur during convalescence from enteric fever.

Nothnagel having brought the literature of the subject down to 1872, the author has collected and summarized a large number of cases reported since that date. He has, however, not found any report of hystero-epileptiform attacks, and therefore records a case of this kind in a waiter, 14 years old, occurring in his own practice.

A. H. Pratt ⁷⁷_{Mar.} relates a personal experience of enteric fever. The noteworthy points were a peculiar, short, rapid, jerky respiration, lasting well into convalescence, and visual disturbances, including apparitions, for some two weeks after recovery.

Heath ²³⁴_{Dec. 78} records an interesting accident in the management of a case of enteric fever. The patient, a native of Canada, 23 years of age, was admitted to the United States Marine Hospital, Detroit, Michigan, June 12, 1888, at the end of the second week of a severe attack of enteric fever. Two weeks after admission he swallowed the clinical thermometer which the nurse had put under his tongue. Mustard was given to produce emesis; this failing, castor-oil was administered in the hope of facilitating the passage of the thermometer through the bowels. This also failed until twelve days later, when the thermometer passed through the anus unbroken, the mercury registering 40.4° C. (104.7° F.).

According to Branson, ⁶_{Apr. 20} the returns of cases of typhoid fever recently published by the Central Board of Health, Australia, as having occurred from December 1, 1888, to January 24, 1889, are as follow:—

	Cases.	Fatal.
Melbourne,	34	6
Ballarat,	3	2
Collingwood,	19	8
Fitzroy,	16	5
Prahran,	27	7
Richmond,	28	4
Sandhurst,	18	7
South Melbourne,	36	13

This statement shows a total of 181 cases with 52 deaths,—that is, 34.8 per cent.

Diagnosis.—Taylor⁶ reports on the value of Ehrlich's urinary test in the diagnosis of typhoid fever. It seems to have been unknown in England until Arthur Sansom learned of it in America. The characteristic red coloration was produced in the urine from every case of enteric fever after the first week, and until the morning temperature became normal. It was also very exceptionally found in the urine of healthy persons, but the red color was not well marked. It was especially common in measles, absent in acute general tuberculosis, but present in a few cases of acute and chronic phthisis. It was not found in lobar or lobular pneumonia, and in only two of a large number of cases of rheumatism was it present. Apart from conditions of pyrexia, it was found with more than average frequency in albuminous urines from cases of both acute and chronic renal disease. The test is made as follows: 25 parts of solution A (consisting of a saturated solution of sulph-anilic acid in dilute hydrochloric acid, 1 to 20) are added to 1 part of solution B (sodium nitrite, 5 per cent. in distilled water), and the whole mixed with an equal bulk of urine and rendered alkaline with strong ammonia-water.

André²⁶ thinks that albumen always appears in the urine of typhoid patients, especially during the earlier stages, and that, as this is a constant symptom, it becomes an important factor in arriving at a diagnosis.

Abortive Form.—Jaccoud¹⁷ affirms that nothing in the early days of an abortive case of typhoid fever enables us to distinguish it positively from the ordinary form of the same malady. The two forms are to be distinguished only by their duration, the symptomatic manifestations being the same. After the eighth day, however, certain indications are furnished by the course of temperature, which, in the abortive form, commences to descend earlier than in

the ordinary form. Even this rule, however, is not constant. It occasionally occurs that in the abortive form the defervescence is abrupt rather than gradual, so that within forty-eight hours after the beginning of the convalescence the symptoms are identical in the two cases. It is easy from this point of view to understand the false position of the physician, who, having announced the presence of typhoid fever, finds himself obliged, in the eighth or tenth day, to declare that the patient is cured of an affection the duration of which all the world knows to be usually protracted. It has been said that the abortive form of the fever is especially frequent among young subjects from the age of 16 to 28 or 30 years, and that it occurs more commonly in the male sex, in individuals of robust constitution, and that it especially prevails during certain epidemics, and is rarely seen in others. These facts, however, have little value from the stand-point of diagnosis, since not only all the symptoms may be the same, but also they may present themselves of the same intensity in the abortive as in the grave forms. Even such symptoms as delirium and albuminuria may present themselves in the abortive form. Even the retention of the urine, amounting to the necessity of catheterization—a symptom, in the ordinary course of the disease, of the third or fourth week—may occasionally show itself in the abortive form. The duration of the abortive form, measured by the date of the final defervescence, is most frequently from ten to twelve days. Then comes, from the point of view of frequency, an interval to the eighth or tenth day; exceptionally, the defervescence takes place upon the seventh day. In point of fact, it is between the eighth and twelfth day that the convalescence sets in, and the diagnosis then must be based upon the general weight of the symptoms, particularly upon the presence of exanthem and the gradual ascent of the temperature in the beginning. It is therefore necessary for the physician, as soon as the symptoms make it necessary for him to speak of a case of enteric fever, to inform the friends of the patient of the fact that there are certain cases of this disease which run a short course,—cases not generally understood by the public,—and that it may happen that the case under consideration is one of these.

The diagnosis of the ordinary forms of enteric fever presents special difficulties during the first week, or until the appearance of the eruption, which takes place normally from the seventh to the

ninth day. At this moment all doubt disappears, for if the *taches* show themselves they render the diagnosis certain; if not, the other symptoms are sufficiently established at this date to dispel all doubt. Prior to this period, however, the difficulties of diagnosis impart special value to a general knowledge of the different forms of beginning typhoid. The most useful distinction from this point of view relates to the fact that usually enteric fever begins with a prefebrile period, the period of prodromes of former writers; exceptionally, there is not such a period.

In the former case the prefebrile period presents symptoms without localization, such as progressive deterioration of health, weakness, restless sleeping, headache, loss of appetite, vertigo, tinnitus aurium, epistaxis, etc. If this period is prolonged to four, five, or six days, it is in itself sufficiently characteristic of the beginning of typhoid. But it occasionally shows itself in another form, namely, that of gastric distress, pure and simple. There is nothing else, the resemblance between the two conditions being for two or three days, or until treatment is instituted, complete. Then, after the administration of an emetic or a cathartic, as is customary in gastric distress, the *malaise* of the latter condition disappears completely. In the case of enteric fever, however, it continues. By this means only can this error of diagnosis be avoided. When, however, the prefebrile period is absent, the diagnosis is still more difficult. Sometimes the onset occurs suddenly, with continuous fever and headache; sometimes the attack begins abruptly by pain in the head and fever, which, instead of being continuous, is intermittent during the first three or four days. Between the paroxysms the relief is not complete. There remains a certain degree of *malaise*, notwithstanding the fall of temperature.

The author insists that in the first form—that is to say, with continuous fever and headache—the diagnosis must be uncertain. The difficulties regarding the existence of pleurisy, pneumonia, etc., usually come to an end in the course of forty-eight hours, whilst those relating to the eruptive fevers commonly come to an end after several days,—in the case of measles, for example, upon the fourth or fifth day. In the second form—that is, where the disease begins with an intermittent fever—the diagnosis must be deferred until the fever becomes continuous, especially if the physician is practicing in a malarious region. In conclusion, Jaccoud points out

the fact that the better the variations of the invasion of typhoid are understood, the greater are the difficulties of diagnosis, and the more important a certain degree of reserve at the beginning of the attack.

Montefusco, of Naples, Italy⁶⁷³ (collaborator), states that augmentation of surface temperature in the right iliac fossa and in the region of the kidneys is always present in enteric fever. The increase is, in the majority of cases, at least, 1 degree, and may rise to 2 degrees. The maximum is observed during the first two weeks and, in severe cases, during the last few days of the disease. The splenic temperature is, in general, higher by two-tenths of a degree or more (sometimes by nearly 1 degree) than that of the right iliac fossa. The inverse is rarely observed, and, in such cases, the difference is but one- or two-tenths of a degree. The local temperature is always lower than the axillary. It is slightly higher in the evening than in the morning.

J. W. Moore¹⁶ _{Dec. 28} reports in detail 4 cases of accidental rashes in enteric fever. They were, respectively, simple hyperæmia or erythema fugax, miliary eruptions, erythema simplex vel scarlatinale, urticaria. The scarlatiniform rash is discussed at length with references to literature. He sums up as follows: 1. Not infrequently, in the course of typhoid fever, an adventitious eruption occurs, either miliary, urticarious, or erythematous. 2. When this happens, a wrong diagnosis of typhus, measles, or scarlatina, respectively, may be made, if account is not taken of the absence of the other subjective or objective symptoms of these diseases. 3. The erythematous rash is the most puzzling of all, but the prodromata of scarlet fever are absent, nor is the typical course of that disease observed. 4. This erythema scarlatiniforme is most likely to show itself at the end of the first or in the third week of typhoid fever. 5. In the former case it probably depends on a reactive inhibition of the vasomotor system of nerves; in the latter, on septicaemia or secondary blood-poisoning, or both these causes may be present together. 6. The cases in which this rash appears are often severe, but its development is important rather from a diagnostic than a prognostic point of view. 7. Hence, no special line of treatment is required beyond that already employed for the safe conduct of the patient through the fever.

Comegys⁶² _{Feb. 1} recognizes the malarial variety of enteric fever: 1. The febrile accession is much more violent, temperature being often

104° or 105° F. (40° or 40.55° C.) on the third day, with remarkable daily fluctuations; at about the fifteenth day it has almost ceased as by crisis; within a day it will reappear on a high plane, and in a remitting character will continue for an indefinite period. 2. Diarrhoea is by no means as common; indeed, constipation is the rule. Tympanites and rose-spots are never marked. Numerous sudamina are frequently seen; tenderness in the right iliac fossa is moderate. Intestinal haemorrhage is more frequent and more violent. Severe neuralgic pains in the abdominal walls and hyperæsthesia of the skin are marked. 3. Occasionally during the high fever he has observed suppression of urine, with albuminuria and tube-casts, accompanied with intense pain in the lumbar region due to renal congestion. 4. Hebetude is not common, but acute phrenitis is occasionally developed and is an extremely grave complication. 5. The tongue is longer, with whitish fur, and slightly œdematosus. Lungs and heart are not so apt to be involved; there is less sub-sultus tendinum, but anæmia is more profound.

Texas physicians ⁸⁵ have been engaged in an extended discussion on so-called typho-malarial fever. The subject remains in the same doubt as before. Some of the papers contain interesting records of personal experience.

Draper ⁵⁹ said that any one who has seen a great deal of typhoid fever must have a doubt as to whether he is not dealing with several forms of continued fever rather than with one. Kinnicutt ⁵⁹ would emphasize the occasional most prominent localization of the typhic infection, even at the onset of the disease, in other portions of the body than the intestine. He cites 2 cases, one of pneumonic process in both upper lobes with acute nephritis, and the other of basic pneumonia of one lung, occurring in a household where three had previously developed, within a few days of each other, typical typhoid-fever symptoms. Rendu ¹⁵² reports an instructive fatal case of enteric fever, beginning as a pneumonia of the right upper lobe. Finucane ⁶ reports a fatal case of perforation in an insane woman in whom enteric fever had not been suspected. Death occurred within forty-eight hours of the first complaint, that of pain in the abdomen.

Geographical Distribution.—Riordan, ²⁰⁶ in continuation of his paper on the subject of enteric fever in India, referred to in the ANNUAL for 1888, vol. i, H-38, presents notes of cases and

statistics in support of his view, which we regard as absolutely untenable, that enteric fever, as seen in India, is not of specific but of climatic or malarial origin. His conclusions are as follow: "1. From mild ague to the most severe enteric so called, every variety of fever with every combination of symptoms has been repeatedly under observation, and the most acute diagnostic skill fails to differentiate the recognized diseases. 2. It is impossible to say that ague may not develop into deadly typhoid, or the severest enteric revert at any time to a simple ague. By this latter is not meant the final intermittent of this equally with undoubted enteric, but the sudden, early, and unexpected collapse of symptoms and fever. 3. Intestinal lesions are present, it is believed, in all cases of continued fever at this station. 4. Many cases have a distinct history of being excited by exposure (chill or sun), and the enteric season is well defined just before, during, and immediately after the rains,—in other words, when susceptibility to chill is at its highest. Without again entering into the question of etiology; without inquiring into the immunity of women, children, and natives; without noticing the evil repute of some cantonments compared with others similarly circumstanced in a sanitary sense, I venture to think that these cases and these figures suggest reasonable doubts as to the specific nature of this disease. May I, therefore, appeal to my brethren either to hold an open opinion for some time longer or to prove or disprove my arguments? The ulcers or other changes in Peyer's and the solitary glands may or may not be identical with the lesions universally known as typhoid; their presence or absence in no way affects the theory above set out. The character of these changes is, however, a most important branch of the subject, and calls for early and thorough investigation, and I readily admit that my case is incomplete until this is done." These somewhat vague propositions beg the question of etiology, and cannot be regarded as being warranted in the present state of knowledge in regard to the specific causation of the fever under consideration.

F. H. Welch²⁰⁰ comments on some points in enteric fever as illustrated by the Army Medical Report for 1886 and the annual report of the Sanitary Commissioner with the Government of India for 1887. Fourteen stations occupied by British troops, and in every quarter of the globe, are noted, and all return enteric fever

except Canada and West Africa. The admission ratio varies from 66.3 per 1000 of strength in Egypt to 1.0 in the West Indies; the United Kingdom giving 1.6, Gibraltar 36.7, India, 15.2 in 1886 and 12.7 in 1887. The death ratio ranges from 21.79 per 1000 of strength in Egypt to 0.46 in the United Kingdom; Cyprus gives 7.86, Gibraltar 6.04, Bermuda 3.26, India 4.57 and 3.76. The mortality ratio was 45 per cent. in Cyprus, 32 in Egypt, 29 in Great Britain, 28 and 29 in India, 16 in Gibraltar. Comparing the army stations one with another, it is apparent that some other countries were worse off than India in disease causation, and worse off in mortality, relatively to their effective army strengths, while the ratio of mortality to cases treated was not greater in India in 1886 to 1887 than in Britain in the first of these years.

The statement that "it is the most fatal of all the diseases to which the British soldier in India is liable" is universally applicable; 312 deaths in India in 1886 is certainly appalling, yet there were 241 in Egypt in the same year, and the large number in India is due solely to the amassing of troops here, as the ratios show.

Enteric Fever in Infancy and Childhood.—An infant of 11 months was proved to have enteric fever by the discovery of the microbe of Eberth in the dejections. ^{152 112} _{Apr. 16; July}

Boobbyer, Medical Officer of Health, Basford District, ^{Jan. 26} reports the case of infection of five out of a family of eight persons, through an infant of 8 months, which had been removed from the breast of its mother. Shortly after the latter was found to be suffering with enteric fever. The child was restless and had constant diarrhoea, but the true nature of its complaint seems to have been unsuspected.

In a case of a child about 10 years of age there was nothing unusual until the fever subsided, in the fourth week, when purpura haemorrhagica supervened. ⁴³ _{Sept.} There was bleeding from the gums, from the nose, and finally haematuria. The purpuric spots appeared first on the feet and legs, then on the arms, then on the trunk, then in the sclerotic.

Read ¹⁵⁷ _{Oct.} reports and analyzes 22 cases of enteric fever in children between 4½ months and 10 years.

T. C. Eberth, ⁵⁰ _{May 8}, reports the following case: A woman aged 30, in the fifth month of pregnancy, was taken with typhoid fever and miscarried. The foetus was at once subjected to a most careful

examination, and in the cardiac blood, as well as in the secretions of the lungs and spleen, the bacilli were found. Strange to say, none were discovered in the liver. Those procured were transferred to cultures and developed further bacilli. Eberth's view that these micro-organisms were true typhoid bacilli was supported by the opinion of other eminent bacteriologists.

Castelain ¹⁸¹_{Dec. 11, Nov. 8} has made a careful study of enteric fever in children. The majority of cases tend toward recovery. He begins treatment with a mild purgative, resorts to cool sponging for the mitigation of fever, and administers quinine, or, in default thereof, antipyrin. Tonics and alcohol are given according to indications. Later, he increases the frequency of sponging or makes use of luke-warm baths (30° to 32° C.—86° to 90° F.). Naphthol and bismuth salicylate are prescribed with a view to intestinal antisepsis. In the third period, he reduces the antipyretic medication, uses sponging only, and not baths. The amount of alcohol is increased. Pullna water or Hunyadi-Janos water is given to produce evacuation of the bowels, if necessary. Ataxic phenomena are combated with quinine or digitalis, the latter especially, if there be increased febrile action. Delirium is treated by musk, bromides, digitalis. Dry cupping is serviceable if there is any tendency to pulmonary congestion. Convalescence must be carefully guarded. If there is an elevation of temperature of 1 or 1½ degrees after the ingestion of solid food, it may be considered normal and the alimentation be continued; but any sudden or great rise of temperature denotes some irritation, and the solid food must be withdrawn, and resumed only very cautiously and gradually.

Gillet ⁸⁵_{Jan. 17} advocates the following measures in the treatment of enteric fever in children. To reduce temperature, he wraps the little patient in blankets saturated with a solution of carbolic acid (30 grains—2 grammes), oil of thyme (10 drops), and vinegar (500 grammes—1 pint). Of antipyretic drugs, he prefers quinine, in doses of about 4 grains (0.25 gramme), to a child of one or two years; or salicylic acid may be used in the same dose with brandy-syrup of orange-flowers, and lettuce-water. Sore throat requires gargles of glycerin and borax; stomatitis, potassium chlorate. If diarrhoea exists he washes out the intestine with a solution of boric acid in boiled water (3 per cent.).

To check the diarrhoea he uses an injection of:—

Infusion of chamomile,	f $\frac{3}{4}$ iss (50 grammes).
Starch,	3j (4 grammes).
Or lime-water,	f $\frac{3}{4}$ iss (50 grammes).
Laudanum (Sydenham), for a year-old child, . . .	gtt. ss.
for a child of 2 or 3 years, . . .	gtt. ij.

Against cerebral excitement he uses camphor, musk, sodium bromide, or chloral. An infusion of roasted coffee is useful in severe cases as a stimulant, and is well liked by children. During convalescence he insists on regular alimentation, tonics, quinine and iron, wine, and aromatic, stimulating baths.

Treatment of Enteric Fever.—Harley, in his Lumleian lectures, ^{Aug. 11} urges more than expectancy in treatment. To restore the functions of the skin and assuage thirst, he advises 50 grains (3.24 grammes) of ammonium citrate with 20 minims (1.23 cubic centimetres) of aromatic spirits of ammonia, either in plain water or with 20 grains (1.30 grammes) of sodium bicarbonate and a table-spoonful or two of lemon-juice as an effervescent draught, every three or four hours; large, hot, flaxseed poultices to the trunk, especially to the abdomen, and alternately to the back or front of the chest, where they may also prevent pulmonary complications. He deprecates both hot and cold bathing, believing that the latter increases internal congestion; and he casts doubt on the significance of Brand's statistics. Generally speaking, the percentage of recoveries will always show some relation to the time the patient first came under medical care. Thus, in his own statistics, with an average death-rate of 11.2 per cent., among those seen in the first week mortality was only 2.7 per cent., while among those first seen in the fourth week it reached 33 per cent., and of those seen later than the fifth week 43 per cent. died. Among his recoveries, 125, or more than half, had a temperature of 104° F. (40° C.) and upward. The moderate use of alcohol is beneficial.

Jaccoud ^{Aug. 4} employs the following method of treatment of enteric fever in the wards of La Pitié. In order to maintain the strength of the patient and to secure an abundant diuresis, he gives from 1 to 2 litres (1 to 2 quarts) of milk daily, supplemented, when necessary, by bouillon and red wine. In pronounced adynamic cases he administered from 4 to 8 ounces (124 to 248 grammes) of brandy in every twenty-four hours, together with 4 grammes (about 1 drachm) of the extract of quinquina and 6 grammes (about 1½ drachms) of acetate of ammonia. As a

means of reducing the temperature, he sponges the whole body with a mixture of cold water and aromatic vinegar four times daily for a temperature of 39° C. (102.2° F.), six times daily for a temperature of 39.50° C. (103° F.), and eight times daily for a temperature of 40° C. (104° F.). When pulmonary complications present themselves he applies from thirty to forty dry cups upon the inferior extremities, repeating this, if necessary, night and morning. As accessory medicines, he uses salicylic acid, quinine, and digitalis, the first two as antipyretics and the last named as a cardiac stimulant.

Jaccoud³⁵ exhibited a patient who had recovered from enteric fever, despite the existence of chronic cardiac lesions (endocarditis of mitral orifice, slighter endocarditis of aortic orifice, and pericarditis). He attributes the exceptional result to the treatment instituted, which consisted, in addition to the usual treatment of *dothiénentérie*, of the administration of quinine hydrobromate. Salicylic acid was interdicted on account of the existence of a bronchial catarrh. When the symptoms were aggravated the quinine hydrobromate was suspended on account of the enfeeblement of the pulse, and infusion of digitalis given.

Bouchard³⁶ gives, at the beginning of enteric fever, during each of four days, 5 pills of calomel, of 2 centigrammes ($\frac{1}{3}$ grain) each. Whenever rectal temperature exceeds 40° C. (104° F.) he begins cool baths; first, at a temperature of 2 degrees less, reducing it every ten minutes till the temperature of the bath falls to 30° C. (86° F.). The number of baths is eight in twenty-four hours. If the bath does not suffice to reduce temperature to 37° to 37.5° C. (98.6° to 99.5° F.), he gives quinine sulphate in doses of 2 grammes (31 grains) in twenty-four hours, at first; gradually reducing to the quantity needful to maintain temperature at 37° C. (98.6° F.), morning, and 38° C. (100.4° F.), evening. For intestinal antisepsis he prefers, above all, naphthol; 5 grammes (77.16 grains) of this, with an equal quantity of bismuth salicylate, being divided into 10 powders, of which 1 is given every hour. If constipation is present, magnesium salicylate is substituted for bismuth.

Burt,³⁷ in an article on the prevention and treatment of enteric fever, emphasizes the necessity of thorough disinfection, and urges protection of water- and milk-supply. Predigested milk he considers the best food for the patient, who must, in addition,

be given sufficient water. Alcohol is exceedingly valuable, but may sometimes be withheld with benefit. Antipyrin is productive of so much cardiac weakness that it is a serious problem if it should ever be administered in enteric fever. The application of cold water, in the form of a tub-bath, has, he thinks, dangers which require caution in the selection of cases, but the milder expedient of sponging with tepid water has much to commend it.

N. S. Davis, Jr.,⁵⁹ Jan. 19 gives a very complete review of the mode of action of antipyrin in enteric fever, and concludes that it has no beneficial effect whatever. The mere lowering of temperature which it accomplishes is not desirable, when brought about by the action of a drug which does not favorably modify the underlying pathological process; while its untoward effects, in depressing circulation and checking the secretion of urine and the elimination of urea, are in marked contrast with the stimulation of nutrition, of circulation, and of excretion of urine resulting from hydro-therapeutic measures.

Buchman⁵⁹ Sept. 29 advocates flushing of the colon. He thinks that from 1 to 3 quarts of cold water can be easily and safely passed into the colon, which will rapidly lower a high temperature. Some of this water passes the ileo-cæcal valve and enters the small gut. Tympanitic distention always disappears with the passing away of the water so injected. Putrefactive fermentation of the bowel contents is prevented by such use of water,—an important point, as toxic substances are more readily absorbed by the cæcum than by any other portion of the intestinal canal.

Backhaus⁶⁰ July reports Mosler's results in treatment by intestinal injections of tannic acid,—an expedient which was suggested by the beneficial results recorded by Cantani from its use in cholera. The indications in both diseases are the same, viz., diminishing bacillary propagation and combating the toxicity of the ptomaines. Mosler begins with a solution containing 2 grammes (31 grains) of tannic acid to 2 litres (2 quarts) of water, increasing the amount later to 10 grammes ($2\frac{1}{2}$ drachms). The injections are administered, with the patient in the recumbent position, twice daily. Backhaus's statistics show that the febrile curve is not influenced, but the profuse diarrhœa is completely controlled or beneficially modified.

Bartlett²⁰⁷ Nov. 29 recalls attention to the plan proposed by Kalb, of Thalmässing, for aborting enteric fever in cases seen before the ninth day. It consists of the inunction of mercurial ointment,

1 grammme (16 grains) every night, rubbed into the thighs and abdomen alternately for six nights, for half an hour each night. Calomel and opium pills are given according to the state of the bowels, and alcohol is advised to be given methodically, though the author has not adhered to this. In all cases where he was clear as to the date of the disease, temperature fell to normal in two or three days, and in five or six days from the commencement of the treatment all other symptoms had disappeared.

J. Michell Clarke¹⁵ _{Dec. 1888} reports 7 cases of enteric fever treated with β -naphthol. It was given in small, frequent doses suspended in milk, and a small quantity of pure milk was administered after each dose. It may be given in gelatin capsules, or the following formula be made use of: R. β -naphthol, gr. xx (1.30 grammes); tr. aurantii, f₃j (8 grammes); syr. limonis, f₅ss (16 grammes); mucilaginis tragacanthi, f₅ij (93 grammes); aquam, ad f₅vj (185 grammes). Dose, f₅j (31 grammes). The patients' ages varied from 10 to 32 years. Four cases, of whom 2 were boys of 12 years, took 3½ grains (21 centigrammes) every two hours during the course of the disease, until the temperature remained normal, for five or six days. One boy, aged 10, took half that dose. In 10 cases the drug was discontinued on account of interference with digestion. In addition to the β -naphthol, acetanilid or phenacetin was given whenever the temperature exceeded 102° F. (38.88° C.). The author concludes that the production of intestinal antisepsis is a rational mode of treatment in enteric fever, and that β -naphthol is a safe and tolerably efficient agent for this end; that by its use in the above cases the duration of the disease was shortened, and the intensity of the symptoms directly arising from profound disturbance in the alimentary canal was lessened; that the tendency to splenic enlargement, albuminuria, and septicaemic complications is diminished; that convalescence is more speedily and satisfactorily obtained, and, through disinfection of stools, there is less risk of the propagation of disease. In some patients gastric disturbance may be excited, preventing continuance of its use.

Petteruti⁵³⁷ _{No. 10; Feb. 9} concludes that naphthol may be administered in doses up to 60 grains (4 grammes) daily. The only unfavorable symptoms observed were a burning sensation felt while urinating and a dark-brown discolouration of the urine. Diarrhoea was rarely observed. Temperature was reduced and did not again rise, even

after the remedy was withheld. With children under 4 years of age, the author began treatment with daily doses of 15 grains (1 grammme), and never exceeded 30 grains (2 grammes). Adults were given four doses of 8 grains (52 centigrammes) each for the first few days, and, later on, eight doses daily of the same quantity at intervals of one hour.

Testi,² at the Congress of Medicine held at Rome in October, 1888, related his experience of thymol in more than 150 cases of typhoid fever treated in the hospital of Faenza. The results were most satisfactory. Temperature was reduced, tympanites diminished, diarrhoea checked, and the putrid products usually found in the excreta notably lessened. The drug had also a marked effect in diminishing the excretion of urea. As it heightens blood-pressure, it has no injurious effect on the heart.

Prince¹¹⁵ reports on the use of salol in enteric fever. In those cases where the remedy was given from the first—that is, during the first few days—there was a fall in temperature in from twenty-four to forty-eight hours from 103° and 104° F. to 98° and 99.5° F. (39.46° and 40° C. to 36.6° and 37.50° C.), the temperature curve continuing at or near this point until convalescence was established, which was in from one to three weeks. The other symptoms of the disease were correspondingly modified. There was generally a continuance of tenderness, tympanites, scanty urine, offensive stools, muscular and nervous debility, headache, anorexia, the appearance of rose-spots, etc., but in a greatly lessened degree and of shorter duration than is generally observed. Salol may be given in doses of from 2 to 8, or even 10 grains (13 to 52, or even 65 centigrammes), every three or four hours, according to age of patient and severity of symptoms.

Day⁶¹ reports a case treated with salol in which relapse occurred after an interval of six weeks, and recovery again took place during the administration of the same drug, to which he attributes curative virtues. [I have reason to believe, from personal observation, that salol is of decided value in some cases of enteric fever in maintaining intestinal antisepsis.—S. S.C.]

Tarbox⁵⁹ reports 16 cases treated with iodine and carbolic acid, with one death. Constipation was the rule in every case. Eight patients had temperature reaching or exceeding 104° F. (40° C.), 2 haemorrhage from the bowels, 3 one or more relapses

each; 1 was complicated with facial erysipelas occurring in the third week, 1 by suppurative synovitis of the left knee-joint.

Hydrotherapy.—Smythe¹⁸⁹ contributes a paper on hydrotherapy in enteric fever. Since publishing his last report, the author states that he has treated 51 additional cases, with two deaths, which, added to the 157 already reported with three deaths, give a total of 208 cases with five deaths. Of the two deaths reported in this series, both were treated with antipyretic medicines and no baths. In every case where the bathing was energetically used the patient recovered. Lacour²¹¹ _{Mar. 10} reports a case of enteric fever occurring at the middle of pregnancy, complicated with marked albuminuria and eclampsia, in which recovery ensued under treatment with the cold bath. During convalescence, abortion took place.

The non-medicinal hydriatic treatment of typhoid fever is warmly commended in a recent paper by Fürbringer.⁴ _{July 8} The mortality in 155 hospital cases was 16,—that is, 10 per cent.,—which Fürbringer regards as low. No abortive remedy was used; neither calomel nor naphthalin,—which latter he regards as useless,—and medicinal antipyretics only in very limited and selected cases; good nourishment was given, with sherry, opium, and camphor, in threatening asthenia. The majority of the patients received a methodical, mostly mild, and individualizing bath-treatment, less as an antipyretic than as an excitant and dietetic (for refreshment of the nervous system, cleanliness, stimulation of the appetite, combating of hypostases, etc.).

Baruch⁵⁰ _{Feb. 18} warmly advocates the Brand method of hydrotherapeutic treatment of enteric fever. The mortality in New York City, according to Board of Health statistics, from 1876 to 1885, was 41.28 per cent., while Delafield's hospital statistics for 1885 place it at 24.66 per cent. Antipyretic medication may render the patients more comfortable, permitting them, as Brand says, "to die with a normal temperature," but it does not decrease the mortality. Brand's now familiar statistics show the astounding reduction of mortality to 3.9 per cent. The cooling effect on the blood is a secondary, though not unimportant, feature of the cold-bath treatment. Its principal value is in stimulation of organic functions by shock to peripheral nerve-endings. Dilatation of arteries and superficial vessels, with diminution of blood-pressure and contraction of blood-vessels in the inner structures, forms part of

the febrile process. The effect of the cold bath is to reverse this condition, as has been demonstrated by Winternitz's sphygmographic investigations. The vivifying effect upon the nerve-centres produces a vigorous cardiac action, evidenced by slower and more regular pulse and improved tension of the vessels. It improves appetite and digestion, enabling us to enforce a better nutrition. It deepens and slows the respirations, preventing stasis of bronchial secretions and obviating pulmonary complications. All the secretions are enhanced, the patient is refreshed and re-invigorated, and fights the battle for life with the chances in his favor. The author considers the various objections and obstacles likely to be encountered by the American physician in attempting to carry out Brand's directions, but urges that they be set aside and the method given faithful, intelligent trial.

Hunt⁴⁰ warmly advocates the cold-water method. Anuschat⁴¹, urges the employment of warm baths in place of the cold water, to which the patients often evince such a great objection that they refuse to re-enter the bath. He disputes Brand's doctrine that the good effect of the cold bath is due solely to the low temperature, as in that case it would be equally advisable in all acute fevers. Anuschat believes the beneficial effect to be due to the water rather than to its temperature, and finds confirmation in the results of 150 cases which he has treated with the warm bath. He administers three baths daily, from fifteen to twenty-five minutes each, at 95° F. (35° C.), if the temperature of the body is between 100.4° and 102.2° F. (38° and 39° C.); at 93° F. (33.88° C.), if the body temperature is 102.2° to 104° F. (39° to 40° C.), and at 90.5° F. (32.50° C.) only if the temperature of the body is higher than 104° F. (40° C.). In most cases a perceptible improvement takes place in three days, with decrease of fever, but the good effect of the warm-bath treatment is most plainly seen in the almost entire absence of secondary symptoms and the much shorter duration of the illness. Of 150 patients, 145 were less than four weeks confined to bed, and most of them less than twenty-one days. When the temperature of the body falls below 99.5° F. (37.50° C.), the bath is administered less frequently. The other treatment—medicinal, dietetic, and stimulant—recommended is much the same as that generally prescribed.

Bataille²⁰³ compares cold affusions with baths after the

method of Brand, and believes that the former are fully as useful as the latter and less difficult to practice. The affusions during the first days are made every two and a half hours with three or four bucketfuls of water. The patient is lifted from his bed like an inert mass and placed in a squatting position in a tub. He receives the water without manifesting any sensation other than a somewhat sobbing respiration. After each affusion he is rapidly dried. Being replaced upon his bed under a single cover, he is allowed to drink a little vinous water. In the intervals between the affusions the salutary action of cold water is kept up by means of cold compresses placed upon the head and abdomen.

Extreme weakness and cardiac depression in enteric fever were successfully treated with cocaine, of which the patient took $\frac{1}{4}$ grain every six hours for nearly a week. ⁶²

Convalescence.—Woodbury ⁶² considers the different preparations of coca especially valuable in convalescence from enteric fever, being superior to digitalis, for instance, in not having a tendency to cause diarrhoea. Hutchinson ¹¹² finds a too early return to solid food prejudicial to the patient. He continues the exclusive milk diet for three or four days after complete deservescence, or adds only animal broths. Then he gives soft-boiled eggs, the juice of rare meat, with milk toast and other farinaceous articles. At the end of a week the soft parts of oysters and fish are added to the dietary; at the end of ten days, the light meat of broiled chicken; at the end of two weeks, butchers' meat. All these articles of food are given in small quantities at first.

ENTERIC, OR TYPHOID, FEVER.

(From the ANNUAL for 1891.)

It is becoming year by year increasingly evident that water, in one form or other, constitutes the almost universal medium of conveying the infection of enteric fever. Each successive ANNUAL brings its quota of reports of epidemics due to the use of water obtained from polluted streams or contaminated wells, or of milk defiled in some way by such water. The evidence is so circumstantial and has become so cumulative that the inference is indubitable even when bacteriological examination fails to disclose the presence of typhoid bacilli.

Etiology.—Almquist ⁸⁴ _{Sept. 27, 1891.} presents a thoughtful paper upon the occurrence of epidemics of typhoid fever in localities which have long been free from the disease. No single factor will explain its spread. It may be carried in the water-supply, or in the milk-supply, or have a local origin in an imported case. The etiology of the disease has not yet been entirely cleared up, while but little is known of the biology of the organism related to it.

Peter, ¹⁰⁰ _{Oct. 14, 1891.} in two brilliant lectures, attacks the theory of typhoid infection by means of drinking-water, and insists upon the recognition of two factors, which he deems of greater importance than the bacillus, namely, the epidemic constitution of the year and the temperament and present mental and physical condition of the individual. He cites cases in which different persons under similar surroundings were differently affected, and dwells upon the epidemic at Bourg, in which cases of "gastric embarrassment" preceded the outbreaks of enteric fever, and in which no bacilli were found in the drinking-water until late in the course of the epidemic. Allen, of Melbourne, ¹⁰⁰⁰ records the occurrence of an epidemic of typhoid fever at Melbourne in the spring of 1879. The son of a milk-man died in the course of an illness presenting the symptoms of typhoid fever. Of ninety-three households supplied with milk by the milk-man in question, typhoid fever occurred in twenty-three. Forty individuals were attacked, of whom three died. From a study of the epidemic from various aspects, Allen concludes that contaminated milk was the cause of the outbreak, that the contamination resulted through some connection with the

excretions of the milk-man's son, and that the occurrence of typhoid fever in those who drank the milk depended upon certain other conditions, not determinable.

Taylor,⁷⁸⁷ Medical Inspector State Board of Health, Wyoming District, reports an epidemic of typhoid fever in Wilkesbarre, Pa., and adjacent boroughs, during the second half of 1889, in which about 700 persons were affected, with some sixty deaths. Observation disclosed the fact that the disease prevailed among those who partook of water from a special source, while others, supplied from a different source, escaped. Boiling the water produced an evident salutary effect. Valid reasons are given showing why the epidemic was not a result of defective sewerage, of the use of infected ice, of exhalations from the streets paved or torn up, or from a filled-in canal, or from covered bog-ponds, or of contaminated milk. The original source of infection, however, could not be located.

Almquist,⁵⁸ reports an epidemic of typhoid fever in one of the provinces of Sweden during the summer of 1889, originating, in all probability, from the milk-supply. In the middle of the month of June, typhoid fever suddenly appeared in a community of 3000 inhabitants. The cases were pretty widely distributed, but it was discovered that those attacked received their milk from the same dairy, a recent establishment. The milk of the day, received from various sources, was all placed in a common receptacle and the cream separated. All who became ill in June were found to have partaken of milk from this dairy. It was also discovered that a woman living in the district had, since a month, been suffering with some febrile affection, probably typhoid fever, and that a child in the same house, a month earlier still, had had some febrile disorder. These 2 cases were probably the starting-point of the epidemic; 104 cases, with 11 deaths, occurred in less than four months. At the end of the month of June the use of the suspected milk was stopped and the epidemic subsided, to break out again in the middle of July. Granting a period of incubation of two weeks, the greatest number of infections must have taken place during the first two weeks of June and in the first half of July.

Herbert E. Smith¹³⁸ was detailed by the Connecticut State Board of Health to investigate an epidemic of typhoid fever at Waterbury. It was discovered that the cases were limited to

families which received their milk-supply from a farmer in whose household there had been 3 cases of the disease. The sewerage and the water-supply were excluded as sources of the infection. P. Ernst⁷⁶⁸ _{B.S.H.I.; Sept. 19}⁵⁰ reports the case of a child born prematurely of a mother sick with enteric fever, which, on the fourth day of extra-uterine life, suddenly ceased its hitherto continuous crying, became intensely jaundiced and covered with a mottled exanthem from the lower extremities to the lower portion of the abdomen. It died the same day. The autopsy revealed icterus, intense injection of the gastric mucous membrane, and moderate acute enlargement of the spleen. Cultures from the spleen and the blood of the heart showed in two days colonies of typhoid bacilli. Numerous bacilli were found in every arterial lumen of the Malpighian bodies of the spleen. Many bacilli were found in the spleen-pulp, often intra-vascular. Some days before delivery, the mother suffered an injury, which possibly caused a lesion of the placenta, with passage of bacilli into the foetal circulation.

Statistics. — MacDonnell⁹ _{Sept. 8} presents conclusions arrived at from a study of 100 cases of typhoid fever observed at the Montreal General Hospital. He found the average age of patients 24.8 years. There were 16 fatal cases. He holds the disease directly communicable. The rose rash was present in 51 per cent. of cases. He thinks the appearance of the tongue diagnostic and prognostic. Meteorism of serious import. In 5 of the 16 fatal cases the spleen was found enlarged, but in only 7 of the 84 non-fatal cases. Diarrhoea was the exception, constipation the rule. Intestinal haemorrhage occurred in 2 of the 16 fatal cases, but in neither was it severe, nor did it appear to be the cause of death. On the contrary, all the cases in which severe haemorrhage occurred recovered. Headache was almost always present during the first half or third of the disease, and disappeared spontaneously. Delirium is thought to be of grave import. The average duration of non-fatal cases was 40.8 days. Retention of urine occurred in 7 of the 84 non-fatal cases and in 4 of the 16 fatal cases. Incontinence of urine and faeces was troublesome in 2 cases, neither of which was fatal. Epistaxis was not serious in any case. Venous thrombosis occurred in 2 non-fatal cases. Relapse occurred in but 1 case. Perforation was found in 1 fatal case. One pregnant woman with typhoid fever aborted and died. No particular line

of treatment was followed. Hyperpyrexia was treated by cold sponging.

Association with Other Diseases.—An editorial¹² quotes the results of certain investigations of Kinyoun, who, in a number of patients, found the plasmodium malariae in the blood and the bacillus of Eberth in the stools. It has long been known that malaria and typhoid fever may co-exist in the same patient, the symptoms of one or the other disease, for the time being, predominating. For these cases the name typho-malaria was invented. Kinyoun proposes the modification, entero-malarial. Furniss⁶⁴⁷ summarizes the replies received in response to three hundred letters of inquiry addressed to medical men in Alabama, as follows: Fevers are not so prevalent now as they were formerly; the period of greatest prevalence was during the years 1881, '82, '83, and '84. The largest numbers of cases occurred during the months of May and October. The types were classified variously as typho-malarial, continued malarial, simple continued, with typhoid complications. The majority, including the ablest practitioners, found typhoid the most common, while the clinical history, the symptoms, the duration, and the treatment supported this view. In the few autopsies reported, the characteristic lesions of typhoid fever were found. The majority believed that the fevers were produced and propagated by a common cause. Intestinal haemorrhage occurred in about 7 per cent. of cases. In the majority of cases, it occurred at the end of the second or during the third week, and was fatal in 66 per cent. of cases in which it took place. Quinine was found useless in treatment, which was principally expectant. Johnston,⁹ in a paper on "The Continued Fevers of the South," read before the American Medical Association, thus summarizes the conclusions at which he has arrived: 1. Enteric fever is a rare disease in the South, in a typical or intense form. 2. There is a probable change going on in the type of enteric fever; it is losing its typical character, and is assuming a less typical and milder form. 3. Many cases of mild continued fever, which have no well-defined or characteristic symptoms, are cases of mild enteric fever. 4. While malarial continued fevers are found in the South, many so-called cases of "adynamic malarial fever," "remittent fever," etc., are, in reality, cases of enteric fever. 5. There is no good reason to believe that there is such a disease as typho-malarial fever.

Pathology.—Meigs,⁹ in the annual address delivered before the Philadelphia Pathological Society, emphasizes the view that typhoid fever is not primarily a disease of the intestines. Microscopic examination of lung, heart, liver, spleen, kidney, ileum, mesenteric glands, and spinal cord revealed various changes. Haemorrhage, fibrinous and catarrhal exudation, round-celled infiltration, and thrombosis were found in parts of the lung. There were evidences of endocarditis and of myocarditis, with degeneration of and haemorrhage into the muscular structure of the heart. The liver presented inflammation of its interstitial structure and cellular degeneration. Sections of the spleen stained poorly. The ordinary lymphoid cells were replaced by much larger multinucleated cells. The kidneys were in a state of cloudy swelling, with desquamation of the glomerular epithelium. The intestines presented the usual infiltration and ulceration of Peyer's patches. There seemed to be an increase of the neuroglia of the spinal cord, especially marked in the columns of Goll in the cervical region, to the detriment of the nerve-fibres.

Kamen,⁵⁷ as the result of a bacteriological investigation of a fatal case of enteric fever, with acute meningitis, concludes that the sole infective agent producing the meningitis was Eberth's bacillus, and that we are justified in speaking of typhoid meningitis, meaning thereby a specific inflammation of the meninges.

A case of typhoid fever is reported by Loriga and Pensuti,⁵⁸⁹ in which left-sided pleurisy with effusion developed. Thoracentesis was performed, and careful bacteriological examination resulted in the discovery of the bacillus of Eberth in the fluid.

Lucatello³ reported, at the Third Italian Congress for Internal Medicine, 12 cases of gastric fever of infectious origin, in which bacteriological examination detected the presence of typhoid bacilli. As a result, he concludes, that, in some instances, acute gastritis with fever is due to an expression of mild typhoid infection.

Klemperer,⁶⁰ before the Verein für innere Medicin, reported a fatal case of typhoid fever, complicated by vomiting and diarrhoea. Death occurred on the fifteenth day. The vomiting resisted medicinal and dietetic treatment. The autopsy revealed two small, longitudinal ulcers on the lesser curvature of the stomach and a diphtheritic colitis.

Pérignon²²⁰ reports a case of typhoid fever in a woman,

aged 28, in which a relapse occurred, with fatal issue, the primary attack being complicated by intestinal haemorrhage. The autopsy revealed, in addition to a perforation of the small intestine, with peritonitis, the ordinary ulceration, the enlarged spleen, ulceration of the stomach, and ulceration of the large intestine, from the cæcum to the rectum.

His, of Leipzig,⁴ reports a fatal case of typhoid fever in a man of 20, in which intestinal haemorrhage and repeated chills occurred. At the autopsy, the small intestines were found in the pelvis, covered by intestinal contents, the large bowel enormously distended. A small perforation was found on the posterior aspect of the transverse colon, while numerous vesicles, containing air, existed on various parts of the colon beneath its serous layer, and the mesocolon was infiltrated with air.

A case of rupture of the spleen, reported by Santi Flavio,⁵⁰⁵ is quoted¹⁷ as a sequel of typhoid fever. A man of 20 was admitted to the hospital with typhoid. At the end of ten days he was taken with severe pain at the base of the right side of the chest. Pleuro-pneumonia was found, followed by an exudative pleurisy, necessitating thoracentesis. In the course of two months the patient was attacked with severe pain in the left hypochondrium, aggravated by palpation in the region of the spleen. The formation of a splenic infarct was suspected, probably of the same origin as the pulmonary complication. The action of the heart was rapid and exceedingly feeble, and œdema of the left lower extremity indicated the existence of venous thrombosis. There was a period of improvement, when the patient was suddenly seized with the severe pain of peritonitis and succumbed. The autopsy revealed, in addition to peritonitis, a rupture of the enlarged spleen, with diffusion of its puriform substance in the cavity of the peritoneum. A recent infarct was found in the neighborhood of the site of rupture. The right kidney also contained an infarct. In the intestines were found the cicatrices of previous ulceration.

Romberg, of Leipzig,⁴ reports a fatal case of typhoid fever in a laborer, aged 34, complicated by abscesses of the liver. The course of the disease was severe, intestinal haemorrhage taking place. Repeated chills occurred, followed by jaundice. Meteorism was marked and enlargement of the liver was detected. The autopsy disclosed ulcers in process of healing in the lowest portion

of the ileum, and suppuration in the mesentery at a corresponding situation. Throughout the liver were found large numbers of miliary abscesses. A thrombus occluded the portal vein and its branches. Abscesses of the liver in the course of typhoid may result (1) from ulceration of the biliary passages, (2) from purulent pylephlebitis in conjunction with ulceration of the bowel, and (3) as a result of pyæmic infection from any other source.

Complications.—Carslaw⁶ reports a case of typhoid fever in a nurse of 23, in which four relapses occurred, with ultimate recovery. The initial attack lasted thirty-four days; the first relapse, twenty-three days; the second relapse, twenty-two; the third, sixteen; and the fourth, ten days. There was an interval of three days between the termination of the primary attack and the beginning of the first relapse; of fifteen days between the termination of the first relapse and the beginning of the second; of ten days between the termination of the second and the beginning of the third; and of sixteen days between the termination of the third and the beginning of the fourth. The illness lasted, in all, one hundred and forty-nine days. In the primary attack, there were marked nervous symptoms, albuminuria, and intestinal hemorrhage, while in the interval following the third relapse there was phlegmasia alba dolens of the left leg.

In a lecture, Laporte²⁴ discussed the cardio-vascular complications of typhoid fever. In addition to the degeneration of the muscular structure of the heart, endocarditis has, in rare cases, been observed. There may occur during convalescence a transitory arteritis, having a special predilection for the lower extremities. Obliterating arteritis has been observed in the upper extremities, in the temporal and Sylvian arteries, and even in the aorta itself. Inflammation may attack the aorta or the semi-lunar leaflets and be followed by insufficiency. The symptoms of these various conditions are localized pains, modifications of pulsation, and the auscultatory phenomena.

Peter,¹⁰⁰ at a clinical lecture, presented a case of myocarditis developed during an attack of typhoid fever. The patient was seized with a sudden, acute pain in the praecordium, with tenderness in the same region, and, on auscultation, a systolic murmur was heard at the apex. The complication is a grave one.

Drewitt⁶ reports a case of typhoid fever in a girl of 12, in

which gangrene of the left lower extremity, below the knee, set in. Amputation was performed above the knee. The main artery of the amputated member contained a red, friable, loosely-adherent clot, extending to the division into the posterior tibial and peroneal. Below this the arteries were empty. The child eventually made a good recovery.

Girode¹⁵² _{July 4} reports a case of typhoid fever, with albuminuria, in a neurotic girl of 17, in which the eruption appeared on the twentieth day following the supposed commencement of the attack. During the progress of the case, the patient passed eighteen lumbricoid worms, four by the mouth, the remainder by the bowel. At the decline of the fever, a cervico-brachial phlebitis developed, manifested by swelling of the entire upper extremity, extending to the side of the face, with pain, tenderness, discoloration, œdema, and local elevation of the temperature. Rusty sputum, blowing breathing, and subcrepitant râles indicated the occurrence of pulmonary infarction.

Chew⁹ _{Oct. 11} reports 4 cases of femoral thrombosis occurring in the course of typhoid fever, in each of which the vein occluded was on the left side, and makes reference to 3 others of the same kind reported by Da Costa. ⁹ _{Sept. 17, '99} He suggests, as an explanation of the frequency with which the left side is the seat of the disturbance, that there may be some anatomical abnormality of the femoral and iliac veins of that side.

Arnaudet²⁰³ _{Nov. 1} reports 3 cases of phlebitis of the calf of the leg, occurring during the subsidence of typhoid, 1 in a woman of 75, another in a woman of 50, and the last in a man of 38. The first was on the left side, the other 2 upon the right. All the cases recovered.

Imredi³⁶⁵ _{Oct. 25} reports a case of enteric fever complicated with left hemiplegia in a man 26 years old. The case had been diagnosed as influenza, and the patient sent out to walk on the fifteenth day. He suddenly lost consciousness and remained unconscious for several hours. Being brought to Kéthli's clinic, the muscles of the left side were found to be paretic in varying degree. The fever ran a course characteristic of enteric fever, and splenic enlargement, rose spots, diarrhea, decubitus, and abscess formation were noted. Recovery took place. Imredi considers it cerebral haemorrhage, and could find only 15 similar cases in literature.

Keim⁷⁸⁷ reports a fatal case of typhoid fever in a boy of 9, in which gangrene of the left cheek occurred during convalescence. Reference is also made to 2 other cases. ¹¹² At a meeting of German naturalists and physicians, Helperich²⁴ reported that in five years he had observed 8 cases of disease of the ribs, in association with, or as a sequel of, typhoid fever. The cartilaginous portion of the rib usually suffered. In half of the cases, but one rib was involved; in the remaining half, more than one. Pain and swelling appeared over the diseased area, which became adherent to the skin, which ultimately broke, leaving a fistula lined by granulations. The general condition is rarely affected. Recovery may take place spontaneously, but is facilitated by curetting and cleaning. Helperich considers this chondritis a direct result of the typhoid infection. As it occurs in persons of mature age, he considers the changes in the cartilage a predisposing cause.

Leudeit²⁰³ records a rare and interesting case of painful œdema of the thorax during convalescence from enteric fever. The patient first complained of pain in the neighborhood of the thyroid gland. Tender spots in the neck seemed to be situated in the course of the left pneumogastric and phrenic nerves. Pain in the region of the shoulder-blade was caused on motion of the arm. A few days later, there developed a strictly circumscribed œdema on the left side of the thorax. It embraced an area extending inferiorly to the seventh rib, superiorly to within a short distance from the nipple, and laterally from nearly the nipple line to the line of the inferior angle of the scapula. This area was not reddened, but was painful upon pressure. There was no fever and no albuminuria. The œdema began to subside in about four days, and by the twelfth day had completely disappeared.

Goldstein⁵⁷ reports the occurrence of erythema exudativum in the course of typhoid fever, in a smith aged 32. In the third week of the disease, innumerable elevated spots, varying in size from a pin-head to a lentil, with a central nodule, appeared over the entire body, especially upon the thorax, back, and arms. The spots were red in color and well defined, except upon the back, where they gradually faded into the uninvolved skin, and disappeared upon pressure. The pharynx, the soft palate, the uvula, and the tonsils were injected, and slight conjunctivitis existed.

The centre of the patches became excavated, and the patch itself bluish from centre to periphery, finally fading entirely. The case was progressing favorably, when, following a severe paroxysm of cough, haemoptysis and epistaxis occurred. A day or two later, the skin and visible mucous membranes were found covered with petechiae. Recovery ultimately took place. Microscopic examination of the erythematous areas disclosed a round-celled infiltration of the layer of the corium immediately beneath the epidermis, but no bacteria were found.

Grüder,⁵⁰ in an inaugural dissertation upon ulcerations of the larynx in typhoid fever, describes three varieties. The first is the so-called specific typhoid ulceration, occurring at the same time as the ulceration of the bowel, and only in situations where follicular structures are present, as on the anterior aspect of the posterior wall of the larynx, at the base of the epiglottis, on the aryepiglottic folds. Bacteriological investigations failed to detect the presence of the typhoid bacillus on these ulcers. In the second division, there are catarrhal manifestations, with a tendency to ulceration. The mucous membrane is reddened and swollen. The epithelium desquamates and erosion takes place. The ulcer may extend down to the cartilage. The catarrhal ulcers seated at the margin of the epiglottis are included in a separate subdivision. They rarely occur singly. The ulceration frequently extends to the pharynx. Diphtheritic ulcers make up the third division. Infiltration is succeeded by necrosis and exfoliation. The prognosis is grave.

Larcher⁵¹ records a case of sudden death from pulmonary embolism following typhoid fever. The case had been one of only moderate severity in a woman who had previously been pregnant. A thrombus formed in a hypogastric vein, from which a bit became detached and swept into the pulmonary artery. McGannon,¹ before the Medico-Chirurgical Society of Montreal, related the history of a girl of 14, in whose family there were cases of typhoid fever, who, though ill, continued her house-work until within a few days of her death. She was feverish, but without serious symptoms. Sudden death occurred by syncope. There was no autopsy.

Spleno-Typhoid.—At the Tenth International Medical Congress at Berlin, Eiselt³ described, under the name of spleno-typhoid, a variety of typhoid fever in which the spleen bears the

brunt of the infection, while intestinal complications are wanting. He makes three subvarieties. In the first the spleen is voluminous, and there is perisplenitis, adhesive or exudative, localized or involving the peritoneum. In the second the spleen rapidly attains a size sometimes enormous, with, now and then, an effusion of blood into the splenic pulp. The fever is intense and continuous, and lasts for from six to seven weeks, giving way for from eight to ten days to apyrexia, to return and continue as long as the tumefaction of the spleen. In the third variety the spleen is large, the fever intense at the beginning. Apyrexia, of several days, sets in at the end of a week, to be followed by fever, this again by apyrexia, and then by fever. Spirilla have never been found in the blood in these cases. That they are cases of typhoid fever is demonstrated by the origin of the contagion and by intestinal ulceration found in fatal cases.

Diagnosis.—Simon⁷⁶ reports having tested the urine of a number of healthy persons, and of patients with various diseases, by means of Ehrlich's method. Only in cases of typhoid fever and phthisis pulmonalis was the reaction obtained, and in only 4 of 26 cases of typhoid fever did he fail to obtain it. In making the test, two solutions are employed, one containing 50 cubic centimetres (8 minims) of hydrochloric acid, water sufficient to make 1000, and sulphanilic acid to saturation; the other, a $\frac{1}{2}$ -per-cent. solution of nitrite of sodium. Forty cubic centimetres (6½ minims) of the first and 1 cubic centimetre (1½ minims) of the second are well shaken together. The action of hydrochloric acid upon the nitrite of sodium forms nitrous acid, which, in the presence of sulphanilic acid, forms diazo-benzene-sulphonic acid. Originally, the mixture was added to the urine in equal parts. If the urine thus treated is overlaid with an excess of ammonia, a ring of color varying from carmine or garnet to eosin forms at the junction of the two. Subsequently, the method was modified by adding to one volume of urine five or six of absolute alcohol, filtering, and then adding the sulphanilic-acid solution.

The color of urine, from a non-febrile case, remains unaffected or merely becomes intensified, when ammonia is added. When the urine contains biliary coloring matters an intensely-dark, cloudy discolored occurs, which becomes reddish violet on boiling.

If there be any doubt of the reaction the mixture is shaken. In case of typhoid fever the foam which forms has a reddish color, or a greenish sediment forms after standing for from twelve to twenty-four hours.

Neumann, in an address delivered before the Berlin Medical Society, ^{Feb. 10} recommends examination of the urine for typhoid bacilli in doubtful cases of typhoid fever. He made 114 observations in 48 patients, and found bacilli in 11. The urine, obtained by a sterilized catheter and received into a sterilized tube, was examined microscopically and cultures made. Germs are not present in urine from a healthy bladder. When typhoid bacilli are present, they occur in large numbers. Viewed in a hanging drop, the urine contains many motile bacilli. This observation must be confirmed by plate cultures. The bacilli of typhoid fever appear in the urine only when the kidney is directly involved. At about the same time as the roseola appears, colonies of bacilli form capillary emboli, which give rise to reactive inflammation. Hence it would be useless to examine the urine for bacilli before this time. The number of bacilli in the urine seems to be in direct proportion to the intensity of the eruption. The appearance of the bacilli has no bearing upon the prognosis, nor is it at all related to nephritis.

Karlinski ⁵⁶⁹_{Nov. 29, 30} has examined the kidneys and urine in 6 fatal cases of enteric fever and the urine in 38 other cases of the same disease. Bacilli were found in all the kidneys examined. In 21 specimens of urine Eberth's bacilli were found, all these urines being albuminous. When albuminuria was transient or absent, no bacilli were found. Sometimes the bacilli appeared earlier in the urine than in the stools. Colonies rapidly increased in albuminous urine and preserved their vitality for a long period. In urine containing bile the bacilli died in five days. Bozzolo ⁴¹_{Aug. 28} considers bacteriological examination of the blood of great diagnostic importance. In 3 atypical cases, he was able to find Eberth's bacillus and thus determine that he was dealing with typhoid septicaemia.

England, of Montreal ¹³⁰_{Nov.} has reported a case of typhoid fever in a hand-fed infant 8 months old. There was vomiting, slight diarrhoea, tympanites, enlargement of liver and spleen, typical rose spots, and febrile elevation of temperature, for a period of three

weeks. Other cases of typhoid fever occurred in 3 pupils at a school in which the father of the infant was principal.

Treatment.—Teissier⁵⁵ Aug. 16 reports 15 consecutive cases of typhoid fever treated by naphthol α , of which 14 recovered, the fatal case being complicated by influenza and purulent nephritis. Six grains (0.40 gramme) of naphthol (alpha), with a little salicylate of bismuth, were given morning and evening. Four cold enemata were administered in the course of twenty-four hours. The afternoon enema was followed by a rectal injection of 60 grains (4 grammes) of the extract of cinchona and 9 to 15 grains (0.60 to 1 gramme) of sulphate of quinine in an infusion of valerian. In addition, 10 ounces (300 grammes) of Bordeaux wine, milk, and bouillon were given. Observations directed to that point demonstrated that naphthol (alpha) diminished the production of toxines in typhoid fever, as manifested by their presence in the urine, probably by neutralizing the toxic substances produced by the bacillus of Eberth.

Cahall⁹ reports 16 cases of typhoid fever treated with salol in powder, 3 grains (0.20 gramme) every two hours, with an average duration of seventeen days. All recovered. The only untoward effect was partial suppression of urine in some cases. Axtell¹⁵⁵ Aug. treated 36 cases of typhoid fever exclusively with bichloride of mercury, $\frac{1}{20}$ grain (0.003 gramme) three times a day, with but 2 deaths. One of the fatal cases was complicated with Hodgkin's disease and the other with melancholia. H. C. Wood⁹ Mar. 5 credits George B. Wood with the original recommendation of turpentine in typhoid fever. There are two periods at which the remedy is indicated. The first is at the end of the second week, when the tongue is dry and glazed, and there is tympanites, with or without diarrhoea. The second is during convalescence, when impaired digestive power and diarrhoea indicate the persistence of intestinal ulceration. Ten or fifteen drops may be given every two or three hours.

R. Ol. caryophylli, Mvj (0.40 gramme).
Ol. terebinthinae, fʒiss (6.00 grammes).
Glycerinæ,
Mucilaginis acacie, ʒiv (16.00 grammes).
Syrupi, fʒi (30.00 grammes).
Aquaæ, q. s. ad fʒij (90.00 grammes).

M. ft. emulsio.

Sig.: ʒij (8 grammes) every two or three hours.

Lereboullet,³ before the Société Médicale des Hôpitaux, reports for Sorel 105 cases of typhoid fever treated by sulphate of quinine and salicylate of sodium, with 5 deaths. Some patients were given warm baths.

Geissler,⁵⁸⁶ of St. Petersburg, as a result of the treatment of 5 selected cases of typhoid fever by means of enemata of hot water, has arrived at the following conclusions: 1. Enemata of hot water exert a favorable influence upon the intestinal tract in typhoid fever; when diarrhoea exists, the frequency of the stools is diminished and their quality improved; abdominal pain is relieved, and constipation, when present, is overcome. 2. Immediately after an enema, the temperature slightly rises; an hour later, it has fallen. 3. The injections seem to promote defervescence, or to transform a continuous fever into a remittent or intermittent one. 4. Immediately after an enema, the frequency of the pulse diminished, to increase at the end of an hour; the pulse becomes firmer and fuller, its dicrotism less pronounced, the cardiac contractions more vigorous. 5. The respiration quickens, to become slower in about an hour. 6. The blood-pressure rises. 7. The daily excretion of urine increases, the specific gravity falling. 8. There is diminished cutaneous and pulmonary transpiration. 9. The enemata are well borne.

J. H. Jenkins¹⁸⁶ Sept. reports a case of repeated and profuse intestinal haemorrhages in the fourth week of enteric fever, in which 1 quart of blood was transfused directly from the common carotid artery of a lamb into the brachial vein of the patient at the bend of the elbow. Immediate improvement was noticed; the pulse, which had been almost imperceptible, becoming fuller and stronger, respiration becoming less labored, nervous disturbances ceasing, and the patient falling into quiet and refreshing sleep. Sixteen days after the operation the patient was able to sit up.

The Brand treatment seems at last to be winning its long-deferred recognition as the method *par excellence* of managing enteric fever. F. E. Hare, resident medical officer, Brisbane Hospital, Australia,¹⁰⁰⁰ describes the method as pursued at that institution, and notes in detail its favorable influence upon circulation, respiration, digestion, secretion, excretion, and nervous phenomena. He states that delirium and stupor frequently disappear in the first bath, almost always after the first few days'

treatment. Headache is always relieved, but returns with the rise of temperature. Sometimes the immediate result of the bath is to increase the pain, but this can always be avoided by sponging the head with ice-cold water before immersing the body. Insomnia is almost unknown. Most patients require to be waked for the bath. This may seem cruel, but the aggregate of sleep is increased by it. Diarrhoea is at first increased, the patient having a stool after each bath, but this soon ceases. Meteorism is greatly lessened. In a later communication, the same observer²⁶⁷ _{July, 1890} compares the mortality in 1828 cases during the period of expectant treatment (271=14.8 per cent.) with that in 171 cases during a period of incomplete bath treatment (21=12.3 per cent.) and 797 cases during the period of strict bath treatment (56=7.0 per cent.). In the latter group, 15 fatal cases should be deducted. In 6 of these, the bath was deemed inapplicable either on account of old-standing organic disease, or because they were in an advanced state of prostration from complications, and 2 were not diagnosed during life. As to the other 7, 4 died in less than forty-eight hours and 3 in less than seventy-two hours. Excluding these, 782 cases gave a death-rate of 5.2 per cent. Of 464 cases not bathed, 5.2 per cent. died from haemorrhage or perforation, *i.e.*, conditions due to the intestinal lesion. Of 968 cases, including 797 bathed, 4.2 per cent. died from the same causes. There is a slight but actual decrease. The reduction of nearly 10 per cent. in the general mortality is due to the avoidance of such causes of death as toxæmia, asthenia, pneumonia, coma, and other conditions due to the febrile state. Before bathing, the mortality from pneumonia alone was about 2 per cent. Among cases bathed it was only 0.05 per cent.

Devic²¹¹ _{Aug. 17} treated 81 cases of typhoid fever in children and infants with cold baths. The ages of the patients were from 2½ to 14 years. Twenty-five were light cases, 12 of moderate severity, and 14 very severe. Two of the elder children died from the intensity of the infection. One very young patient died of a rare complication, purulent pericarditis following a purulent bronchopneumonitis. The mortality was thus 3.7 per cent. The duration of the baths was ten minutes, the temperature 20° C. (68° F.)

West,⁷ _{Feb.} as a result of investigations made in collaboration with Roque, bearing upon the elimination of toxic matter in the urine of typhoid-fever patients treated by cold baths, reaches the

following conclusions: 1. In typhoid fever treated by the method of Brand the elimination of toxic matters in the urine, measured by means of intra-venous injection of urine into rabbits, showed a decided increase. The mean of quantities eliminated is to the normal as are 2.5, 2.6, 2.8 to 1. 2. The urotoxic coefficients are increased in greater or less degree from the time of giving the bath to the eighth or tenth hour thereafter. From this time it remains for several hours at a pretty constant level, to descend progressively to the normal. The curves which represent the intensity of the urotoxic coefficients sometimes present irregularities, owing either to a temporary depression of the ascending line, which corresponds to a transient aggravation of symptoms, or to sudden elevation of the descending line, which precedes convalescence.

The maxima of elimination correspond sometimes to the period of numerous baths, sometimes to that of infrequent baths. The action of the bath is immediate, but the baths exercise also a distant influence which continues into convalescence, even after they have been withdrawn. The urotoxic curves and those which indicate the quantities of urine passed in twenty-four hours are not parallel. A high degree of polyuria may correspond with a small urotoxic coefficient and inversely. Diuresis is, then, not the principal agent governing the elimination of poisons in the urine.

There is thus strong evidence, experimental as well as clinical, of the utility of the cold bath, applied in the manner detailed by Brand, in the treatment of enteric fever. In what way the good effect is brought about is yet beyond our knowledge. There is no sound reason for believing that this method of treatment has a specific application to enteric as contradistinguished from other forms of fever; but it will find its largest field of usefulness in the management of enteric fever as the most common form and the best type of continued fever.

It seems probable that the bath exerts its beneficent influence upon the febrile process or, more accurately, upon the phenomena of this process, as manifested in the reduction of temperature, the strengthening of the pulse, the regulation of the circulation and respiration, the subsidence of irritability, the disappearance of insomnia, and the general subjective improvement. Particularly interesting and suggestive are the experiments demonstrating the increased excretion of toxic matters in the urine in association

with the bath treatment. These effects are to be attributed in part to heat-radiation and heat-conduction, in part to reflex action upon the nervous system with consequent modifications in metabolism, etc. To secure the best results the bath must be administered in strict accordance with the formula of Brand, without addition, subtraction, or modification. The contra-indications are few, and are practically limited to intestinal perforation, peritonitis, and copious haemorrhage from the bowel.

ENTERIC, OR TYPHOID, FEVER.

(From the ANNUAL for 1892.)

Epidemiology.—Jaeger ⁵⁸ reports an epidemic of typhoid fever in which there occurred 12 cases, with 4 deaths. The first 5 cases were palpably due to contagion, while the almost simultaneous occurrence of the last 7 suggested for them a common origin. Suspicion was at once directed to the water-supply, examination of which disclosed the presence of typhoid bacilli.

Magnant ¹⁰⁰ reports an epidemic, involving 14 persons living in four different houses, with 2 deaths, the origin of which was ascribed to the dissemination by the air of the contents of a privy-well, into which, a year previously, the undisinfected stools of a patient with typhoid fever had been thrown. Masse ⁷⁰ reports the case of a workman, who, while engaged in removing an obstruction and repairing a leak in the outlet of a water-closet in a house in which there had been a case of typhoid fever, was considerably spattered on the body, the lips, and the nostrils by an unexpected discharge of faecal matter. In less than a week the man developed characteristic symptoms, and subsequently passed through a pronounced attack of typhoid fever.

Houser ¹⁹² reported the case of two boys who, within two weeks after immediate exposure to a horribly foul odor from a sewer, developed enteric fever that pursued a typical course, although the boys lived far apart, and there was no epidemic of the disease at the time. Dartigolles ¹⁸⁸ observed a small epidemic in which it was thought that the disease was disseminated by the washing of the linen of several families in water in which the clothing of a patient with typhoid fever had previously been washed. The epidemic subsided when the common washing-place was closed up.

Lardier ³³ relates several interesting observations of the development of the disease as a result of the ingestion of water contaminated a long time previously by dejections from patients suffering from typhoid fever.

Destrée ²⁷⁶ made a number of interesting observations in the course of a limited epidemic of typhoid fever in an inundated sec-

tion of the city of Brussels. The inundation occurred on January 25th. In the months of January, February, and March, 52 cases of typhoid fever were treated at the Hôpital St. Jean. Of these, 42 had used pump-water; 6 had been exposed to the danger of direct infection; in the remaining 4 the source of the disease was unknown. Each of these had drunk only water from the city supply; 1 had used pump-water in washing dishes; another lived in a cellar that had been overflowed. Of the cases that had drunk pump-water, the first symptoms appeared in January in 7, in February in 27, and in March in 6. Of the 27 cases that developed in February, 23 were in persons that lived in the inundated section of the city. The 6 cases in which direct infection from soiled linen and faecal matter was suspected included a domestic, a nun, and two nurses who had rendered the patient assistance; a steward who had washed the linen, and a servant who had been treated for pericarditis, but had left the hospital.

Sedgwick⁹⁹ _{Apr. 22, 1890} gives the details of an epidemic of typhoid fever at Lowell, Mass., beginning in September and culminating in November, 1890. From all the testimony that could be gathered, it was demonstrated that the epidemic had its origin in the water-supply from the Merrimack River, infection of which had taken place as a result of contamination of the water of a nutrient stream into which, preceding the epidemic, the stools of patients with typhoid fever had been thrown.

Willoughby² _{Jan. 24} reported a localized outbreak of well-marked enteric fever in a village having a population of 1800. Twenty-four cases occurred, with 3 deaths, all, with one exception, among a dozen families occupying two detached blocks of cottages,—one in the high road and the other in a brick-field at some distance. The water used by these families was obtained from two shallow wells, not more than four feet deep, dug in the surface-sand resting on a stiff clay, which, from the downward approaches, received storm-waters and surface-washings. The water of one well contained 16, and that of the other 6 or 7 grains (0.96, 0.39, 0.45 gramme) of chlorine in the gallon, other evidence of organic pollution being in like proportion, and the former was exposed to further contamination by percolations from cow-yards.

Littlejohn³⁶ _{Mar.} describes an epidemic in which 63 cases could be directly traced to the milk supplied from one dairy, the drain-

age and water-supply of which were in such a deplorable condition that contamination of the latter was scarcely avoidable. Inquiry directed to other possible sources of infection failed to determine an adequate cause for the epidemic. Von Mering ⁵⁷ _{Oct. 18} reported the outbreak of numerous cases of enteric fever in two prisons remotely separated. Investigation disclosed that those prisoners were affected who, at certain specified times, obtained milk from a common source, upon the suppression of which no further cases appeared. It was also learned that there was no reason to suspect the cows from which the milk was obtained of being infected, but it was probable that either the milk was diluted or the cans were washed with infected water. Lenhartz reported the case of a woman who became infected by drinking milk kept in cans that were rinsed with water obtained from a well that was evidently contaminated by filtration from an adjacent latrine.

Christian, ²³⁴ _{Apr.} in an epidemic involving 11 persons in four families, traced the probable source of infection to the milk obtained from a cow that had drunk at a well, the water of which, on investigation, proved chemically and bacteriologically unfit for drinking purposes. Brown ¹⁹ _{Aug. 8} reported the occurrence of 5 cases of typhoid fever in families living far apart that received milk from a dairyman in whose family there had been 2 cases of the disease. The water-supply was excluded as the channel of infection. It was learned that the servant having the disposition of the milk had assisted in washing the linen of the 2 cases in the dairyman's family without observing suitable disinfectant precautions, and in this way had probably conveyed the infection. Eberth ¹³ _{Jan.} reported the case of a pregnant woman who, in the third week of an attack of typhoid fever, expelled a twenty weeks' foetus, still inclosed in its membranes. With rigid anti-septic precautions, some blood from the heart, some pulmonary tissue, and some fluid expressed from the spleen were taken from the foetus. In cover-glass preparations of these, as well as of blood from the intervillous spaces of the placenta, typhoid bacilli were found. Cultures in gelatin and on potatoes developed typically. Comparative observations upon eight other foetuses, of non-typhoid mothers, demonstrated the absence of typhoid bacilli. Amquist ⁵⁸ _{Mar. 19} states that, when a case of typhoid fever gives rise to secondary cases, the latter develop at an interval of three or four

weeks, several persons being simultaneously affected. To support his proposition that typhoid fever is contagious, Spiers⁵³ has recorded the case of a farm-hand who was seized with typhoid fever while away from home, although he had been at home a number of times during the preceding five months. He was isolated, and nursed by his mother. It was directed that the stools be buried. On the thirty-first day of the boy's illness his mother was stricken with the fever. A little later a younger son, who had come in contact with the first during his illness, developed typhoid fever. On the seventy-first day of the mother's illness a daughter, who had nursed the former, became ill with typhoid fever. The mother died on the eighty-seventh day of the disease. Of two boys who assisted in changing the position of the mother the younger developed typhoid fever. Another son and two daughters—who seldom, if at all, entered the sick-rooms—escaped.

Bacteriology.—Vaughan³⁹ takes issue with those who maintain that typhoid fever is dependent upon a single specific organism. He admits that a germ responding to the tests supposed to be characteristic of the bacillus of Eberth is invariably found in the bodies of those dead of typhoid fever, and that this germ has been isolated and grown in pure culture; but he maintains that all attempts to induce typhoid fever in the lower animals by inoculation with this germ have been unsuccessful, and that experiments demonstrate that not only does the germ not multiply in the lower animals, but that, when introduced by inoculation, it soon dies. Silvestrini⁹⁰⁰ has demonstrated that if to a bouillon culture of typhoid bacilli, kept for twenty-four hours at a temperature of 32° C. (89.5° F.), an equal part of defibrinated rabbit's blood is added, most of the bacilli are destroyed; those that survive reproduce others. If the mixture is again placed in a thermostat for twenty-four hours, and more blood is added, a large number of bacilli of the new generation is destroyed. It is thus evident that rabbit's blood has a microbicidal action upon typhoid bacilli. It was found that 40 parts of blood were necessary to sterilize 1 part of bouillon culture, but more than 100 parts of blood were required to sterilize the mixture of equal parts of bouillon and blood. In plate cultures of a mixture of 1 part of blood and 10 of bouillon 310 colonies developed, while in plate cultures of a mixture of 1 part of bouillon and 30 of blood but 65 colonies

developed. By this method of successive selection a typhoid virus resistant to the action of the blood of the rabbit was obtained. By inoculating rabbits with cultures of 3 parts of blood and 1 of bouillon symptoms of enteric fever were developed. Four rabbits that died after intervals varying from seven to fifteen days presented intestinal hyperæmia, swelling, and necrosis of Peyer's patches, enlargement of the mesenteric glands, and tumefaction of the spleen. Cultures made from the pulp of the spleen were characteristic of typhoid bacilli.

To determine whether the action of the bacilli of typhoid fever is toxic or infective, Cygnaeus⁷⁶⁸ inoculated intra-venously, intra-peritoneally, or by the mouth, 16 rabbits, 11 dogs, and 8 mice; 9 of the rabbits, 3 of the dogs, and all of the mice died. Nine mice exposed to air impregnated with typhoid bacillus were unaffected. The results, however, were not conclusive.

In none of 21 cases of typhoid fever in which the stools were examined could Karliński⁵⁰ find typhoid bacilli earlier than the ninth day following the chill (which seems to be the initial symptom). In several instances the bacilli were first found in the third week. The number of bacilli increased from day to day, but diminished rapidly as soon as the body-temperature began to decline and the stools became firm.

Kitasato⁵⁸ has found that typhoid bacilli in culture generate no indol. This peculiarity may be utilized in investigations to determine the presence of typhoid bacilli in milk. Holz⁵⁸ has found that typhoid bacilli present a characteristic growth when cultivated upon the acid gelatin prepared from the expressed juice of raw potatoes. The growth of molds and of yeast-fungi in this gelatin may be prevented by the addition of 0.05 per cent. of carbolic acid.

Pathology.—Fernet^{17, 73} reports the case of a woman, 79 years old, who presented indefinite symptoms of typhoid fever: headache, delirium, vomiting, and a faecal odor of the breath. On the twentieth day of the disease decided manifestations of meningitis developed: strabismus, exophthalmos, and retention of urine. The temperature became subnormal, coma set in, and death occurred on the twenty-fourth day. At the autopsy, a single Peyer's patch was found involved. The cerebral meninges were injected and contained an excess of fluid; the pia was adherent. In the

inflammatory products the typhoid bacillus was found. Chauf-fard ³ _{Sept. 20} related a case of adynamic typhoid fever, in a woman 30 years old, in which the action of the heart became accelerated and intermittent, and death resulted from asthenia. At the autopsy, in addition to the ulceration of the ileum, the heart was found softened, and of a pale, yellowish tint, with small areas of deeper yellow. On microscopical examination of fresh sections, the muscular tissue of the heart was found in different stages of degeneration. The myocarditis of typhoid fever is to be ascribed to the action of the toxic products of the activity of the typhoid bacillus.

Schlier ³²⁶ _{1845, II, 3, 4} recorded a fatal case in a man 19 years old, in whom, at the autopsy, it was found there had been a submucous purulent cholecystitis, with rupture of the gall-bladder into the peritoneum, and peritonitis. Microscopically examined, the fluid from the wall of the gall-bladder was found to contain bacilli resembling typhoid bacilli. Culture-tests were omitted.

Merkel ³⁴ _{Feb. 10} reported a case of typhoid fever, in a young man, in which, before defervescence had occurred, icterus developed, and death took place, amid symptoms of peritonitis. At the autopsy, in addition to swelling of the spleen and intestinal ulceration, there were found the evidences of a diffuse peritonitis, the starting-point of which appeared to be a healed peritonitis at the under surface of the liver. An abscess of the wall of the gall-bladder had ruptured. There was phlegmonous inflammation of the submucous coat of the wall of the gall-bladder, with sieve-like perforations leading into the cavity of this viscus. In the pus, in addition to staphylococci, bacilli resembling typhoid bacilli were found. Cultures were not made. Gall-stones were not found.

Lefèvre ⁷ _{Nov. 20} reported a case, on the twentieth day of which—when the gravity of the symptoms seemed to have moderated and the general condition to have become less alarming than it had been—intestinal haemorrhage occurred, followed by sudden but transient depression of temperature. Subsequently the patient complained of diffuse abdominal pain, most decided on pressure in the iliac fossæ, but without tympanites; at the same time there was vomiting, in part of a greenish material. A second haemorrhage occurred on the twenty-fifth day of the disease, and in the fifth week the patient died of exhaustion. At the autopsy the

entire colon, from the cæcum to a little above the anus, contained confluent areas of ulceration. Malvoz²⁹ reported a fatal case, in which, at the autopsy, about a dozen small ulcers were found in the small intestine, a little above the ileo-cæcal valve. The mesenteric glands were swollen and softened; the spleen was considerably enlarged; on the inner surface of the gall-bladder were a number of small ulcers, while the peritoneal surfaces of the gall-bladder and the adjacent colon presented evidence of inflammation. The kidneys contained a large number of small foci of suppuration. In the lesions of the gall-bladder and kidneys only streptococci pyogenes were detected.

Raymond⁵⁵ recorded the case of a woman 31 years old, in whom, on the thirty-seventh day of a relapse of typhoid fever, characterized by grave symptoms, with acute maniacal delirium, a circumscribed area of induration, tender to touch, was detected in the umbilical region. Eight days later death took place in coma. At the autopsy, numerous cicatrices and some ulceration were found in the ileum and cæcum, but no evidences of perforation. The peritoneum was free and intact, and presented no signs of disease, recent or remote. The brain presented no gross lesion. A transverse incision of the abdominal wall opened a large cavity, situated between the aponeurosis of the abdominal muscles and the subcutaneous fat, having no communication with the abdominal cavity, and containing two quarts of reddish, odorless pus. The walls of the abscess-cavity were infiltrated, œdematosus, and, on microscopical and bacteriological examination of the contents of this abscess, the bacillus of typhoid fever was exclusively found.

At a meeting of the Clinical Society of London, Phillips² presented the specimens of 2 cases of typhoid fever in which, although death had occurred at a late day in the disease, no ulceration of the bowel was found. The first case was characterized by a copious eruption of rose-spots, a temperature of 104.4° F. (40.2° C.), delirium, tremor, a pulse of 150, looseness of the bowels, and a typhoid state. Death took place on about the thirty-sixth day. At the autopsy, it was found that Peyer's glands, in the lower third of the ileum, were extensively infiltrated; the mesenteric glands were enlarged, but no ulceration existed in any part of the bowel. In the second case rose-spots were present, the temperature rose to 104° F. (40° C.), manifestations of pneumonia

appeared, and a typhoid state developed. There had been marked tremor, but no diarrhoea, although the stools were typhoid in character. At the autopsy, Peyer's patches were found infiltrated; the mesenteric glands were enlarged; the base of the right lung was in the stage of red hepatization, but nowhere was ulceration found.

Bremer⁸² presented to the St. Louis Medical Society the specimens from 2 undiagnosed cases of ambulatory typhoid fever in which death occurred suddenly. Both presented pneumonia. In the one ulceration was found not only in the ileum, but in the duodenum and in the colon as well. Typhoid bacilli were found in the intestines, in the lymphatic vessels, in the spleen, in the liver, in the kidneys, and in the lungs. In the second case there was medullary swelling of Peyer's patches. An enormous number of typhoid bacilli were found in the organs examined. Krüpenin,²⁰⁷² as the results of a study of seventeen parotids and eighteen submaxillary glands from 16 fatal cases of enteric fever, concludes that the suppurative parotitis of enteric fever is dependent upon the penetration of pathogenic micro-organisms from the oral cavity. Exceptionally, the parotitis may be metastatic, the pathogenic agent penetrating from adjacent diseased lymphatic glands along lymphatic vessels. In none of the glands were typhoid bacilli found. Carbone⁹⁹⁷ has recorded a fatal case of enteric fever, in a young woman, in which, at the autopsy, in addition to the classical lesions of the disease, an acute endocarditis was found associated with presence of typhoid bacilli, intravenous injections of cultures of which were, in various animals, followed by a reproduction of the same lesion.

In a fatal case, with multiple foci of suppuration, Laveran³ was able to find in the pus only staphylococci pyogenes aurei, while microscopical examination of sections of degenerated muscle failed to detect the presence of typhoid bacilli.

Atypical Forms.—Karlinski⁸⁴ has reported 3 fatal cases of atypical typhoid fever. In the first the spleen was enlarged, but the remaining essential phenomena of the disease were wanting. Microscopical and bacteriological examination of the blood and of the urine failed to detect the presence of micro-organisms or of plasmodia malariae; examination of the faeces failed to detect typhoid bacilli. At the autopsy, the spleen was enlarged, but no lesions

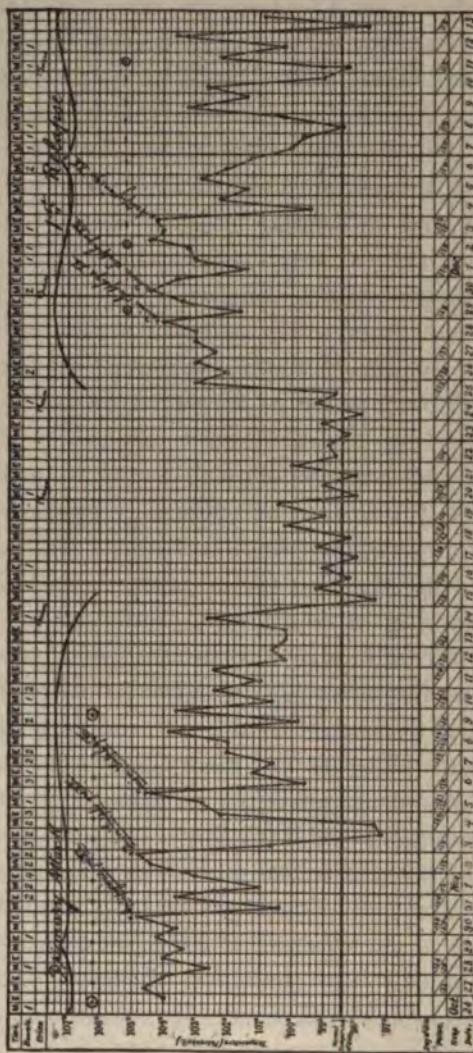
were found in the intestines, nor were the mesenteric glands enlarged. The blood contained in the heart, the heart-muscle, the liver, the kidneys, and the spleen were examined bacteriologically. Only cultures of the splenic pulp developed the typhoid bacillus. In the second case a considerable number of dark-red, lentil-sized spots, slightly raised above the surface, but disappearing on pressure, appeared upon the trunk; the spleen was enlarged. No bacteria were found in the blood or in the urine. At the autopsy the spleen was found considerably enlarged; in the right ventricle, on the septum, beneath the endocardium, were two small, grayish areas of softening; nothing abnormal was found in the abdominal cavity. Plate cultures were prepared from the contents of the areas of softening in the heart, from the splenic pulp, from the blood contained in the heart, and from the liver and kidneys. Those from the blood of the heart remained sterile, while in all of the others typhoid bacilli developed. In the third case typhoid bacilli were found in blood removed from the arm. At the autopsy the ileum, close to the cæcum, contained four small, pigmented, radiating, firm cicatrices; the spleen was greatly enlarged. Cultures were made from the blood of the heart, of the splenic vein, of the portal vein, of the jugular vein, of the splenic pulp, and of the renal artery. All yielded typical growths of the typhoid bacillus. As a result of a considerable experience in the study of the bacteriological aspect of typhoid fever, Karlinski concludes that the lymphatics constitute the channel of dissemination of the typhoid bacilli. Bacilli are often found at points remote from the intestines, they are only exceptionally found in the blood, while they are almost invariably found in the thoracic duct.

Chantemesse³⁰³ June 20 maintains that anatomical changes in Peyer's patches should not be considered an indispensable criterion for the disease. The typhoid bacillus may, as in the foetus, invade the organism without giving rise to a lesion of Peyer's patches; it may remain in an organ, and retain its vitality and its virulence for a long time after the disease has apparently terminated; it may give rise to septicæmia, as it does in some animals. Observation has shown that the spleen and mesenteric glands may contain pure cultures of typhoid bacilli, while the intestines remain intact. In the variety known as spleno-typhoid there is fever of recurrent type, while symptoms of intestinal disease are wanting; the spleen is

enlarged, but there are slight or no changes in the bowels. Splenotyphoid differs from recurrent fever in the absence of spirillæ. The affection known in Bosnia and Herzegovina as the "dog disease" is probably typhoid fever modified by malarial fever. Teissier¹⁶⁴ records the case of a man, 17 years old, who, six days previously to coming under observation, suddenly, during the night, without apparent cause, was seized with headache and profuse epistaxis. On the following day pain in the back was superadded. Subsequently the man felt feverish, languid, and depressed, and had numerous loose stools, together with severe abdominal pain. There was also anorexia and insomnia. The temperature was 37.2° C. (99° F.); the pulse, 84. The abdomen was yielding and slightly protuberant; gurgling could be elicited in the right iliac fossa and in the course of the colon; the spleen was not enlarged. The facies presented a degree of depression out of proportion to the negative signs. The temperature pursued a progressively declining course, the pulse falling to 64. Three days after admission and nine days after the onset rose-spots were found upon the abdomen; on the following day the area of splenic percussion dullness was enlarged. The temperature pursued an inverse course, progressively declining during the first period (corresponding to the usual ascent), then pursuing a continuous (subnormal) course, and finally gradually ascending in the third stage (corresponding to the usual decline). Baginsky¹⁵⁸ observed 9 cases of enteric fever in children between 2½ and 11 years. Noma developed in one.

Complications.—Hugues and Lévy²⁴³ have recorded the case of a man who suffered an ordinary attack of typhoid fever, the temperature becoming normal during the fourth week of the disease. In the fifth week, without obvious cause, a relapse set in. In the sixth week abscesses developed in both forearms and in the left arm. Incision of an abscess of the forearm was followed by extravasations of blood into the intra-muscular and aponeurotic tissues, an acute haemorrhagic diathesis subsequently manifesting itself by the appearance of petechiae, ecchymoses, and profuse and obstinate epistaxis. Ultimately, however, convalescence set in, and recovery took place, the patient being dismissed on the ninety-ninth day of treatment. Almost a year later the patient again developed typhoid fever, the attack lasting for fifteen days, and being followed by a relapse, which also lasted for fifteen days. Springle²⁸² has

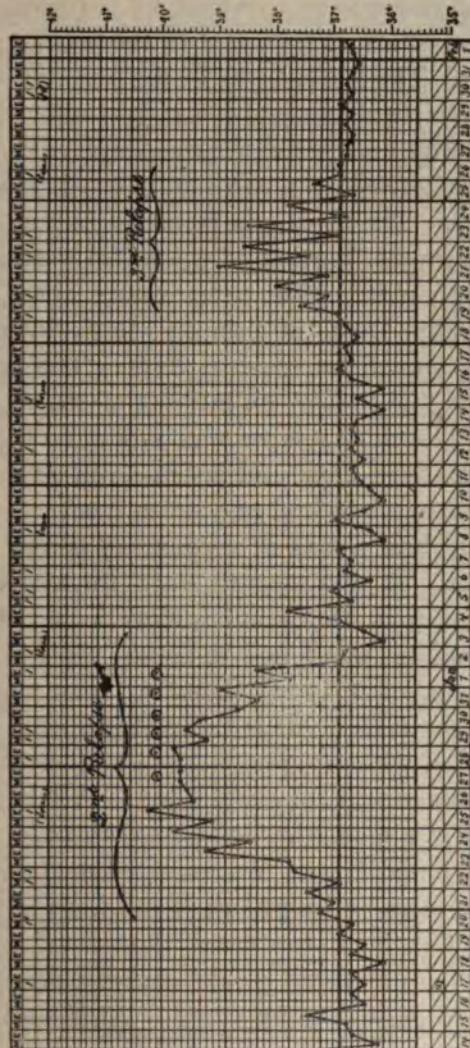
reported the case of a man, 19 years old, who had a mild attack of enteric fever, lasting about two weeks, and characterized by rose-spots, retention of urine, and jaundice. With the disappearance of the symptoms and the subsidence of the temperature solid food



TEMPERATURE CHART IN JOHNSTON'S CASE.
(*Medical Chronicle*.)

was resumed. On the seventeenth day the patient walked out-of-doors; two days later a relapse set in. During the first week the temperature ranged between 100° and 105° F. (37.8° and 40.6° C.); the pulse was dicrotic and ranged between 100 and 140. The spleen was enlarged, and there was great iliac tenderness. For

forty-eight hours there was incessant vomiting. Toward the close of the first week profuse intestinal haemorrhage occurred. There was considerable tympanites. In the second week there was vomiting, retention of urine, and slight diarrhoea. Rose-spots appeared



TEMPERATURE : HART IN JOHNSTON'S CASE.
(*Medical Chronicle*.)

in profusion. The symptoms gradually subsided, and recovery ensued. The duration of the relapse was thirty days.

Johnston⁹⁰ has recorded 3 cases with multiple relapses. One occurred in a man 39 years old, in whom only a portion of what was considered the primary attack was observed. The patient

had two relapses, and was in the hospital for eighty-one days. The first relapse was separated from the primary attack by an interval of nine days, and lasted three weeks. The second relapse developed nine days after the first had terminated, and lasted nineteen days. The second case was in a woman, 21 years old, who also had two relapses. Rose-spots were present in the primary attack and in the second relapse. The patient was in the hospital for seventy-six days. The first relapse developed seven days after the subsidence of the primary attack, and lasted thirteen days. There was an interval of four days between the two relapses. The second relapse lasted twenty days. The third case occurred in a woman 17 years old, in whom the greater portion of the primary attack and three relapses were observed. (See temperature chart.) The first relapse was separated from the primary attack by an interval of nine days, and occupied twenty-two days. The second relapse was separated from the first by an interval of six days, and lasted seventeen days. The third relapse was separated from the second by an interval of thirteen days, and lasted seven days. The patient was in the hospital one hundred and seven days.

McPhedran³⁹ had a case of moderately severe enteric fever in a young woman. In the seventh week the temperature, without apparent cause, presented evening elevations. At the end of three weeks a thrombus was found to be extending in the course of the left femoral vein. Previously there had been tenderness, upon deep pressure, in the pelvis. It is thought probable that in not a few cases, protracted without apparent cause, there may be inflammation of veins inaccessible to exploration. A fatal case of pylephlebitis occurred in a man who had passed through a moderately severe attack of typhoid fever. As convalescence was about to set in the temperature became irregular; there were recurrent chills, with sweating; jaundice developed, and the area of hepatic percussion dullness became increased. Subsequently, the manifestations of chronic purulent peritonitis appeared. At the autopsy chronic purulent peritonitis and diffuse pylephlebitis were found. The peritoneum was covered with considerable plastic exudate. In the mesentery, near the ileo-caecal junction, was found a small abscess, apparently originating from a mesenteric gland, and causing both the pylephlebitis and the peritonitis. Valentine⁴ has reported 2 cases, in one of which, during a relapse, an abscess of the left fibula

developed succeeding an injury; in the other an empyema developed. In both cases typhoid bacilli were exclusively found in the pus.

Orlow⁶⁹ had a case in which, eight months after the beginning of an attack of typhoid and six and a half months after its cessation, living typhoid bacilli were found in a granuloma of the tibia, for the relief of which operative interference became necessary. Medvei⁵⁷ has recorded a case, in a 12-year-old girl, in which the manifestations of grave cerebro-spinal meningitis were, in four days, followed by the appearance of symptoms of typhoid fever. On the twenty-fourth day of the disease a firm, resistant tumor was detected in the left iliac fossa, and on the following day a lumbricoid worm was passed by the bowel. Eventually, the child made a complete recovery. Medvei expresses the belief that the case was one of both cerebro-spinal meningitis and typhoid fever. He was unwilling, however, to ascribe the two diseases to a common cause,—the typhoid bacillus,—preferring to consider them intercurrent.

Jacob³² has recorded a number of interesting features in connection with 50 cases of typhoid fever observed in the Adelaide Hospital during an epidemic in Dublin in the latter half of 1889. The mortality was 14 per cent. One death resulted from perforation; none from haemorrhage. The majority of fatal cases at first appeared mild. One case developed a psoas-abscess, and died from protracted suppuration. Another, apparently convalescent, developed and died of pulmonary tuberculosis. One case died of heart-failure. In one case a relapse took place after the patient had been dismissed. The primary attack was complicated by erythema nodosum of both legs and arms. The relapse was complicated by oedema of one of the lower extremities, probably as a result of thrombosis of the femoral vein. The temperature was higher and the symptoms were more profound in the relapse than in the primary attack. Three cases presented influenza during convalescence. Not more than three-quarters of the cases presented a typical eruption; in not a few undoubted cases not a single spot was to be found. In several cases there was, at some stage of the disease, in addition to the regular eruption, a diffuse erythematous rash. In a large number there was no diarrhoea. In not a few there was obstinate constipation. Two cases developed in persons

who had nursed patients ill with typhoid fever. One case was complicated by acute nephritis. Two cases, complicated by pneumonia, terminated fatally. In one case an ischio-rectal abscess developed; in another, a parotid abscess; and in a third, a psoas-abscess. The last case proved fatal. In one case a severe and prolonged rigor occurred on the twentieth day, and the temperature rose to 105.4° F. (40.8° C.); but, after free perspiration, declined to 99.2° F. (37.3° C.). On the following day the rigor was repeated, and the temperature rose to 106.2° F. (41.2° C.); a sweating stage followed, and the temperature declined to 98.8° F. (37.1° C.). On the next day the train of symptoms was repeated, the temperature, however, reaching 107° F. (41.7° C.), but within twelve hours falling to 97° F. (36.1° C.). These paroxysms continued daily for three weeks, and gradually subsided under the influence of quinine. On the forty-second day of the disease a dysenteric attack set in and continued for two weeks, the patient being able to sit up on the fifty-seventh day.

A child of 6, in a family of which two other members had enteric fever, presented symptoms of typhoid fever, although the eruption was wanting. At the end of the fourth week convalescence appeared to be established. The lungs had previously been carefully examined, but no signs of disease were detected. The child now had an attack of chicken-pox. The case did well for a fortnight, when, one evening, the temperature rose to 103.8° F. (39.9° C.); on the following evening it was 105° F. (40.6° C.), and the child again became extremely ill. The spleen was enlarged, and evidences of infiltration of the apices of the lungs became manifest. Subsequently the abdomen became distended, and presented signs of ascites. Death took place in the sixteenth week of the illness. At the autopsy there were evidences of peritonitis. In the lower portion of the ileum Peyer's patches were prominent and deeply stained, as if as a result of past inflammation. Only in the neighborhood of the cæcum and in the cæcum itself were ulcers found; these were tuberculous. The mesenteric glands were enlarged and cheesy. There was a large cavity in the upper lobe of the right lung. There were extensive deposits of tubercle in both lungs, the process being the more advanced in the right lung. In 1 case, in a child, cancrum oris developed in the third or fourth week, and death resulted. In 1 case right

hemiplegia and aphasia, with some loss of sensation, developed in the third week of the attack. Two cases presented phlebitis of the femoral vein. In the case of a boy, a condition of imbecility appeared during convalescence.

Jaccoud²¹² _{Sept. 10} related an interesting case of typhoid fever with numerous complications, and death from perforation. The case was, from the outset, recognized as a grave one, because of the unvarying temperature. It may be accepted as a rule that, when the remissions of temperature in typhoid fever are persistently smaller than the physiological diurnal variations, the case is a grave one. The case in question also presented atony of the bowel. There were no spontaneous evacuations, but when enemata were administered the stools were diarrhoeal. In the course of the attack severe pain in the left hypochondrium suddenly developed. An infarction of the spleen, which was enlarged, was diagnosed, and the diagnosis was confirmed at the autopsy. Finally, several days after defervescence had begun, there was a sudden elevation of temperature, with a violent chill and intense abdominal pain and meteorism. Death occurred thirty-four hours after the first chill.

Destrée²⁷⁶ _{Aug. 5} believes that, while the typhoid bacillus is occasionally the sole factor in the causation of suppuration in the course of enteric fever, in the large majority of cases suppuration complicating typhoid fever is dependent upon secondary infection by ordinary pyogenic micro-organisms. In 4680 cases tabulated by Fitz⁹⁹ _{Oct. 1, 18} there was a mortality of 6.58 per cent. from perforation of the bowel. The complication is much more common in males than in females,—as 71 to 29. It is rare in children, while it is most common between 10 and 40. Perforation may take place between the end of the first week and the sixteenth week, though it is most common between the second and sixth. In 167 cases the perforation was situated in the ileum in 136 (81.4 per cent.), in the large intestine in 20 (12.9 per cent.), in the vermiform appendix in 4, and in the jejunum in 2. In each of 19 cases there were two perforations, in each of 3 there were five, in 1 there were four, and in each of 4 there were several. In 1 case there were from twenty-five to thirty holes, and in another there were thirty. Of 134 cases, 37.3 per cent. died on the day of perforation; 29.5 per cent. on the day following operation; 83.4 per cent. died

within a week of perforation. Nine cases lived into the second week, 4 into the third, while 1 lived for thirty days, and another for thirty-eight days after the accident. The occurrence of perforation bore no definite relation to the severity of the disease. In about one-quarter of 200 cases it was stated that the attack was mild. Fourteen were cases of ambulatory typhoid. In some cases perforation was unattended with symptoms; in others the symptoms were latent; in some gradual; in some sudden. Of 167 cases of perforation of the bowel, in typhoid fever, in but 5 is it stated that the appendix was perforated.

Major²² had a case in a man 21 years old, in whom sudden symptoms of collapse indicated the perforation of an intestinal ulcer. Three weeks after the onset of the acute manifestations a gush of dark-looking fluid took place from the anus, followed in half an hour by a second gush. In three days all trace of swelling had disappeared. Convalescence soon followed, and went on to complete recovery. Schuster¹⁵⁸ has reported 2 cases of laryngotyphoid in which laryngeal manifestations preceded the onset of enteric fever. Gellé²⁷ considers the general and local conditions that favored the perforation of the nasal septum, occurring in the course of typhoid fever in an adolescent of 16 years. An important factor is the profound depression of the nutritive and nervous forces. With the general emaciation, there occurs a remarkable thinning of the cartilaginous portion of the nasal septum, to induce ulceration and perforation of which but slight traumatism—such as may be inflicted by the picking of the nose—is requisite. Once established, the perforation displays little tendency to close. It may prove the point of departure for secondary infection.

Kieseritzky²¹ has reported the case of a woman, 23 years old, who, on the seventh day of an otherwise normal puerperium, presented a febrile temperature of progressively ascending type. In the absence of any detectable lesion in the genital tract, and in the presence of an enlarged spleen, a diagnosis of typhoid fever was made. On the ninth day a diffuse roseola appeared all over the body. As, on the eleventh day, the roseola commenced to fade, a diffuse erythema, somewhat resembling the eruption of measles, appeared. On the twenty-fourth day of the attack the stools contained small quantities of blood and bed-sores developed. The

stools also contained blood on the twenty-eighth and on the thirty-fourth days. The heart was now enfeebled, the pulse dicrotic. On the thirty-second day the left leg was observed to be oedematous, and a hard cord was felt in the upper third of the course of the femoral vein. Convalescence finally set in, but was protracted.

Talamon ³¹ _{May 22} states that cases of enteric fever, in which the onset is marked by an acute pleurisy of special characteristics, are to be distinguished from cases of simple pleurisy by the intensity and continuous course of the fever, by the general depression, by the headache and vertigo, and by the sleeplessness. Pleuro-typhoid is to be distinguished from acute purulent pleurisy. In the latter the physical signs are in accord with the constitutional symptoms; the intensity of the dyspnoea and the suddenness with which the effusion occupies the entire pleural cavity will necessitate thoracocentesis, when the character of the effusion will be revealed. In pleuro-typhoid, on the contrary, the symptoms are out of all proportion to the physical signs; with the evidences of an ordinary pleurisy and moderate effusion are associated high fever and adynamia. There is some resemblance between tuberculous pleurisy and pleuro-typhoid; but the temperature of the latter is continuous until the remission of the second week, while the temperature of the former is oscillatory and remittent, with distinct morning remissions and evening exacerbations. Should any doubt continue, it would be dissipated by the eighth or ninth day by the presence or absence of rose-spots, of diarrhoea, and of other characteristic symptoms.

Hanquet ⁴⁵⁴ _{June} records the case of a man 32 years old, in whom an attack of typhoid fever was gravely complicated by the formation of many bed-sores, and to which subsequently dry gangrene of a large number of phalanges of both feet was superadded. He also describes the case of a man, 25 years old, who, at the conclusion of an attack of typhoid fever, remained debilitated and emaciated, instead of entering upon convalescence. It was not long before the evidences of a pleural effusion appeared; and these subsequently indicated the existence of pyothorax. Constitutional treatment failing to dissipate the collection of fluid, pleurotomy eventually became necessary; in the pus streptococci were found. Wedensky ¹¹⁸ _{Feb. 22} reports the case of a lad 17 years old, in whom symmetrical gangrene developed two years after an attack of

typhoid fever. The peripheral nerves were found degenerated, but no changes were found in the peripheral vessels or in the cerebral nervous system. It is believed that the morbid changes were induced by a toxic action of the products of the activity of the typhoid bacillus. Péan and Cornil¹⁰ have recorded the case of a girl of 19, in whom, in the course of a protracted convalescence from typhoid fever, pain and swelling developed in the left tibia. An incision gave exit to a little pus, but did not relieve the pain or reduce the swelling. Five months later two prominences were found on the left leg: the one, a little below the tubercle of the tibia; the other, at the junction of the middle and inferior thirds of the bone. The latter was the larger; it had developed rapidly, and was exceedingly painful. A third mass was seated on the right tibia. An operation revealed the swellings to be occupied by cavities possessing hard, smooth walls, and containing vascular tissue. The skin was thinned, but the periosteum was thickened. A suppurating periostitis was found in connection with the lower tumor of the left leg. The condition of the patient was relieved, although a fourth swelling appeared at the outer margin of the left forearm. Cultures prepared from the contents and the walls of the cavities developed typhoid bacilli.

Potain reports the case of a man 25 years old, in whom typhoid fever developed two weeks after convalescence from an attack of scarlatina. The case was pursuing an apparently mild course, when, early in the third week, fatal perforation of the bowel took place. Hare and Patek^{9, 10} have reported several cases of typhoid fever presenting unusual complications. In the case of a woman 24 years old acute maniacal delirium developed during the first week of the disease, before the appearance of rose-spots. Subsequently, in addition to the eruption, the tongue became heavily and typically coated, the temperature pursued a characteristic course, and the peculiar odor observed in typhoid fever became manifest. The patient grew worse, and died during the third week of the disease, without a restoration of psychic equilibrium. The second case occurred in a man, 34 years old, who had been nursing his wife, ill with typhoid fever. Seventeen years previously he had had an attack of typhoid fever, with intense delirious excitement. The patient complained of headache and insomnia. Subsequently acute maniacal delirium developed, hy-

perpyrexia appeared, and death supervened. In a girl 22 years old, with a history of chronic suppurative otitis media, facial erysipelas developed at the height of a secondary attack of typhoid fever. The case terminated favorably. In another girl 20 years old facial erysipelas, preceded by chill and elevation of temperature, developed in the third week of an attack of enteric fever. The intercurrent affection in no way seemed to increase the gravity of the case. During the third week of a mild attack of enteric fever, in a girl 19 years old, the temperature suddenly rose to 104° F. (40° C°.); to decline, after a cold bath, to 98° F. (36.7° C.), with a loss of the pulse at both wrists. Intestinal haemorrhage was suspected, but in the course of twelve hours facial erysipelas developed, and the further progress of the case was uninterrupted.

In an epidemic of typhoid fever observed by Finlayson⁵ in an infirmary, several of the inmates had slight attacks of fever, lasting a few days and terminating in recovery. One patient had an attack lasting two days. Fifteen days later she had a relapse that proved fatal in four weeks. In the case of a man living in a house in which there was typhoid fever, and who was ill and "out of sorts" for two weeks, his temperature not rising above 100° F. (37.8° C.), a carbuncle developed and death took place from septicæmia. In another case, in which the urine contained albumen and tube-casts, convulsions (probably uræmic) set in, and were followed by death on the seventeenth day. In a fourth case, in which a gangrenous spot appeared on the sole of the foot, at the end of a month cystitis developed and death took place in the sixth week. In a case in which a relapse occurred, low, muttering delirium, attended with hallucinations, set in with the subsidence of the pyrexia; there was a peculiar tremor of the head, as well as complete sleeplessness. In another case in which a relapse took place, the temperature rose suddenly, two weeks after the defervescence, with the development of pain in both tibiae, dependent upon necrosis, as the further progress of the case demonstrated. In one case solidification of the base of one lung in the fourth week of the disease was followed by gangrene and death in the eighth week. In 1 case numbness and stiffness of the legs and weakness of the arms, with muscular wasting, developed three weeks after the termination of an attack of typhoid fever. The administration of tonics and the employment of electricity were followed by recovery. In

1 case the symptoms of enteric fever were preceded by those of meningitis. Subsequently the symptoms of meningitis again manifested themselves. Progressive emaciation set in, and death took place a month after the onset of the illness. The autopsy disclosed the existence of tuberculous meningitis and of partially cicatrized ulceration of the small intestine, not tuberculous.

Wilson ¹⁹ has reported a case of caries of a costal cartilage following enteric fever.

Cerné ²⁰³ _{Apr. 1} details, a case of typhoid fever, in a child 11 years old, in which the most distressing symptom was intense pain in the right flank. The pain was relieved by the application of a blister. A diagnosis was made of ulceration of the hepatic flexure of the colon, or of a loop of intestine caught between the diaphragm and the liver, with adjacent pneumonia and perforation of the intestine into the pleura and lung. The great emaciation, the intense pain, the oppression, the incessant dry cough, and the frequent pulse rendered the prognosis dubious. Remissions in the patient's condition, however, took place. These were associated with increased expectoration, while with suppression of the expectoration the condition was aggravated. The symptoms and the signs gradually receded, and in the course of three months the patient was restored to health.

McKechnie ²⁰² has reported 2 cases of otherwise mild typhoid fever, in which manifestations of deranged cardiac function were prominent. Phillips ⁶ _{May 30} observed a mild case in an adult male, in whom the action of the heart was feeble and irregular. During convalescence considerable elevation of temperature suddenly occurred on a number of occasions. In one exacerbation the temperature reached 106.1° F. (41.1° C.). Dysart ²⁰³ _{Dec. 10} has recorded a case, in a man of 35, in which—four or five days after a syncopal attack in the third week of the disease, ascribed to the formation of a heart-clot—inflammation and thrombosis of the left femoral vein occurred.

Gosse ⁶ _{Dec. 12, '90} describes the case of a man 18 years old, in whom, in the third week of a tardy convalescence from an attack of enteric fever lasting five weeks, the dorsum of the left foot became purple, then mottled and gangrenous. Under treatment the slough came away in the course of a week, exposing the tendons and muscles. The denuded surface was almost completely cov-

ered with granulations when the patient was discharged, in the ninth week of convalescence. Spirig²¹⁴ had a case of a woman 22 years old, in whom, in the fifth week of an attack of typhoid fever, after the intensity of the disease had subsided, suppuration manifested itself in the right lobe of a goitrous thyroid gland. An incision gave exit to considerable pus, in which, on microscopical and bacteriological examination, both typhoid bacilli and staphylococci pyogenes albi were found.

Peter,³ at a clinical demonstration, presented a man, 26 years old, with decided neurotic tendencies, who, during convalescence, displayed a polymorphous erythema. In the course of a mild attack the man had had profuse sweats, intense dyspnoea, and for a short time was speechless. During convalescence the skin in places presented large areas of redness, with fine punctation; at other places there were large, coarse papules; elsewhere, and especially on the face, there were numerous pustules. Scarlatina, measles, and variola were excluded; nor was the eruption to be ascribed to the administration of copaiba, belladonna, or bromides. At the Second Congress of Mental Medicine, at Lyons, Joffroy³ reported several cases, attended with profound delirium, in which inquiry disclosed the existence of mental disease in the antecedents. The conclusion is, that when insanity develops in the course of or as a sequel to typhoid fever the latter is but the exciting cause.

Statistics.—MacDonnell²⁸² has reported an additional series of 32 cases of enteric fever treated at the Montreal General Hospital (see ANNUAL, 1891). Most of the patients were admitted during the winter service. There were no deaths, although there were many severe cases. MacDonnell reiterates his view that tuberculosis is rarely a sequel to typhoid fever. He believes that, preceding the local manifestations of pulmonary tuberculosis, there occurs a tuberculous fever, which is liable to be mistaken for typhoid fever. Cutaneous eruptions were present in 19 cases. In 1 case, that proved severe, the rash gradually extended from the abdomen all over the body to the arms and thighs, and over the neck and face to the lower lid of the right eye. A scarlatiniform rash was observed in 4 cases; these proved severe and protracted. The rash was diffuse, but was not as intensely red as the exanthem of scarlatina; nor was it punctate. It was particularly well marked

about the neck and chest, but was not accompanied by sore throat. In 1 of these cases an attack of urticaria developed in the fourth week subsequently to the administration of a dose of potassium bromide. In another case, in which, however, no bromide was given, urticaria also developed. In a young woman herpes zoster appeared during convalescence, and occasioned much distress. In but 1 case was there diarrhoea; in none was excessive meteorism present. In 12 cases the spleen was found to be decidedly enlarged. One case remained in the hospital for a hundred days. The temperature became normal on the thirty-fifth day; it remained so for a week, and then slowly rose to 102° F. (38.9° C.); it continued high for three weeks more, slowly again reaching the normal. The case presented many unfavorable symptoms. After leaving the hospital periostitis, perichondritis of the costal cartilage of a rib, and periostitis of the adjacent sternum took place. Another case remained in the hospital for ninety-four days. The temperature became normal on the thirty-first day. After an apyrexial period of six days the temperature again slowly rose, and remained high for two weeks; finally, however, reaching the normal on the eighty-first day. In the relapse troublesome retching developed, and a round-worm was vomited. One case occurred in a pregnant woman: when the temperature became normal she returned to her home, and was delivered; three weeks later she returned with a relapse and a fresh crop of spots. Two of her children also had typhoid fever. Subsequently the woman developed periostitis of the right tibia, and ultimately chronic pulmonary tuberculosis. One case occurred in a woman in whom, a year previously, the vermiform appendix had been removed. In this case and in another incessant cough was an annoying and alarming symptom.

As a result of observations upon 384 cases, Zieniec ⁵²⁰ _{No. 41, 30} found that throughout the febrile period the daily loss of weight was 0.6 per cent. The loss did not cease with the disappearance of fever. Both loss and subsequent increase of weight were greatest at first, and grew progressively less. Diarrhoea, diaphoresis, and intestinal haemorrhage increased the loss of weight and retarded increase. When threatening symptoms, such as delirium, were present, the daily loss of weight became 1 or $1\frac{1}{2}$ per cent.; this increased loss was also observed in case of complications, such as pleuritis, pneu-

monia, parotiditis, otitis, and became apparent even before their development. A sudden cessation of increase in weight is indicative of the occurrence of a relapse. During convalescence the muscular strength increases $\frac{1}{2}$ kilo ($1\frac{1}{4}$ pounds) daily. When the daily loss of weight exceeds 1 per cent. the prognosis is grave. In fatal cases the total loss of weight was 22 per cent. of the body-weight.

Hölscher ³⁴ has reported 2000 fatal cases of typhoid fever in which autopsies were held. Twenty-four per cent. died from the immediate effects of the typhoid poison. In 24 cases death was reported as sudden,—in the majority from degeneration of the heart-muscle. Tracheotomy was performed in 15 cases, usually for perichondritis of the larynx. Pregnancy proved a serious complication. Of the 800 women in the series, 27 were pregnant. There were 5 cases of ambulatory typhoid; 2 of these died from indiscretions in diet, 2 of degeneration of the heart, and 1 of decided anaemia. Relapse took place in 103 cases. The proportion of males to females was as 3 to 2. The average age was $27\frac{1}{2}$ years. Of the males, 1 was over 75 years old and 1 was a nursing infant. Of the females, 1 was 72 years old, 1 was 9 months old. In 50 per cent. of the cases death took place in the third and fourth weeks; in 25 per cent., in the second and fifth weeks; in $2\frac{1}{2}$ per cent., in the first week. Over 50 per cent. of those who died in the first week were free from complications. The causes of death that prevailed in 5 per cent. of cases or more were the following: œdema of the lungs, 15 per cent.; parenchymatous and fatty degeneration of the heart, 13 per cent.; parenchymatous and fatty degeneration of the liver, 10 per cent.; bronchitis, 10 per cent.; lobular pneumonia, 8 per cent.; croupous pneumonia, 7 per cent.; hæmorrhagic infarction of the lung, 6 per cent.; perforation of the intestines, with peritonitis, 6 per cent.; intestinal hæmorrhage, œdema of the brain, and bed-sores, each 5 per cent.

Sequelæ.—Bourdillon ³ reported a case in which atrophic cirrhosis of the liver was observed in the sequence of an attack of typhoid fever. Liszt ⁵⁷ observed a case in which suppurative inflammation of the middle ear developed in the fourth week of an attack, and subsequently to which florid pulmonary tuberculosis developed, with a speedy fatal termination. At the autopsy

typhoid cicatrices and tuberculous ulceration were found in the intestines side by side.

Diagnosis.—As a result of observations made in 87 cases of typhoid fever, Rütimeyer²¹⁴ _{Na.10.90} concedes to the diazo-reaction a high diagnostic significance. Together with tumor of the spleen and roseola, he considers the reaction one of the most constant and earliest manifestations of the disease. Landouzy³ _{June 8} has described a type of asthenic fever, dependent upon the invasion of the tubercle bacillus prior to the formation of tubercles, to which he gives the name of pretuberculous bacillary fever, or typho-bacillose. The greatest circumspection is required to distinguish it from typhoid fever. In 10 of 14 cases of suspected enteric fever Redtenbacher¹¹⁴ _{Na.19.p.305} was enabled, by puncture of the spleen and bacteriological examination, to confirm the diagnosis. In 1 of the remaining 4 cases the puncture was not deep enough to penetrate the spleen; in another case the disease was probably subsiding; a third subsequently developed purulent meningitis,—so that in only 1 did the method really fail. In all of the cases bacilli had been looked for in the stools and in the blood of the rose-spots, but were not found. The procedure, even if repeated, proved harmless.

Treatment.—For purposes of disinfection, Dujardin-Beaumetz⁸⁰ _{Jan.15} recommends a cupric sulphate. A solution of 50 grammes (about 1½ ounces) to a litre (a quart) of water should be kept in the vessel intended to receive the dejecta; such a solution will also serve to disinfect soiled linen and to purify water-closets. A solution of 12 grammes (3 drachms) to the litre (1 quart) will serve for washing the hands and face of those in attendance upon the patient, as well as the parts of the cutaneous surface of the patient that have been soiled by the dejecta. In the treatment of the disease, Dujardin-Beaumetz prefers salol to all other agents. From 2 to 4 grammes (½ to 1 drachm) of the remedy alone or in combination with bismuth salicylate may be given in the course of twenty-four hours. While admitting the utility of baths, not only cold, but also tepid, Dujardin-Beaumetz expresses his depreciation of systematization in the treatment of enteric fever. Yeo⁶ _{Apr.11.18} commends the employment of chlorine-water in combination with quinine. Forty minimis (2.5 grammes) of strong hydrochloric acid are introduced into a 12-ounce (360 grammes) bottle containing 30 grains (1.97 grammes) of potassium chlorate. Chlorine-gas

is at once liberated. The bottle is tightly corked, until it has become filled with the greenish-yellow gas. The water is poured into the bottle little by little, shaking well after each addition, until the bottle is filled. To 12 ounces (360 grammes) of the solution are added 24 or 36 grains (1.55 to 2.33 grammes) of quinine and 1 ounce (37 grammes) of syrup of orange-peel. Of this mixture 1 ounce (31 grammes) is given every two, three, or four hours. A number of illustrative cases are reported. Wolff⁹ _{May 22} gives the results of observations upon 100 cases treated with naphthalin. On admission to the hospital 2 doses each of a grain (0.065 gramme) of calomel with soda were administered, at an interval of three hours, unless diarrhoea forbade. Immediately afterward 5 grains (0.32 gramme) of purified and finely-powdered naphthalin, in capsules, were administered every four hours, alternately with a small dose of dilute hydrochloric acid. Chemical antipyretics and cold-sponging were employed only when indicated by hyperpyrexia. The diet consisted of milk, alternating with meat-broths containing raw eggs. Stimulants were administered as required. Of the 100 patients thus treated the mortality was 10 per cent.

Waugh⁷⁶⁰ _{June 12} has employed zinc sulpho-carbolate in more than 100 cases of typhoid fever without a death. He administered 2½ grains (0.16 gramme) every two hours, until the stools were no longer offensive in odor, and then with sufficient frequency to maintain the stools free from odor.

Smakowsky,⁵⁵¹ _{No. 1} from observations upon 700 cases of enteric fever, concludes that the administration of fractional doses of calomel constitutes the simplest and the most efficacious mode of treatment. Three-fourths of a grain (0.049 gramme) are given every hour, for 10 doses if necessary, or until copious, soft, greenish stools have been induced, a gargle of potassium chlorate being simultaneously employed to prevent the development of stomatitis. When the action of the heart is feeble, treatment with calomel is preceded by the administration of infusion of digitalis. A second course of calomel may be given after an interval of a day. During this time and subsequently 2½ grains (0.16 gramme) of bismuth subnitrate, 1½ grains (0.097 gramme) of quinine sulphate, and ¼ grain (0.052 gramme) of naphthalin are administered in powder.

Hayem²¹² _{Oct. 10} recommends the employment of lactic acid. Given

in large doses, it is said not only to control the diarrhœa, but also, under certain conditions, to abridge the duration of the disease. In most cases the remedy is well borne. In mild cases 15 grammes (4 drachms) in a litre (1 quart) of lemonade, sufficiently sweetened, may be administered in twenty-four hours. The addition of carbonated water will overcome excessive acidity of taste. Should constipation result, enemata may be necessary. As the fever declines the dose may be reduced to 12 and then to 10 grammes (3 and $2\frac{1}{2}$ drachms) daily; during convalescence 5 grammes ($1\frac{1}{4}$ drachms) may be administered in twenty-four hours. Should the temperature reach 40° C. (104° F.) or higher, the daily dose should be made 20 grammes ($5\frac{1}{4}$ drachms). If diarrhœa be excessive, or meteorism be decided, 25 or 30 grammes ($6\frac{1}{4}$ to 8 drachms) may be given daily. When large doses are indicated, it is preferable to administer 15 or 20 grammes (4 to $5\frac{1}{4}$ drachms) of lactic acid conjointly with 2 grammes (32 grains) of hydrochloric acid. In the doses indicated lactic acid is innocuous. In the severest cases the employment of cold baths should be added to the medicinal treatment.

Keegan²⁶ has successfully employed boric acid, in doses of from 10 to 20 grains (0.65 to 1.30 grammes) every four hours, in a considerable number of cases. Hill¹⁹ maintains that ergot overcomes the headache, sustains the circulation, controls the diarrhœa, prevents intestinal hæmorrhage, exerts a favorable influence on the inflammatory process, relieves tympanites, and diminishes the likelihood of perforation. In some 30 cases of typhoid fever in which ergot was employed the results were most satisfactory. From 20 to 30 minims (1.25 to 1.87 grammes) of the fluid extract were administered every four, six, or eight hours, according to the indications of the case.

Prochaska⁵⁶⁹ has employed sodium iodide in 361 cases, with 17 deaths. The remedy was given, in doses of 5 grains in milk, every two or two and one-half hours. Commonly, an equal quantity of sodium benzoate was conjointly administered. In 40 per cent. of the cases the duration of the disease was abridged. The higher the temperature and the more profound the symptoms, the larger should be the dosage. The treatment should be continued until the tenth afebrile day. Neither age, nor sex, nor incipient tuberculosis, nor intestinal hæmorrhage is a contra-indication.

Wilson⁹ _{Dec. 5, '90} has reported a series of 40 cases treated by cold baths without a death. Cases seen before the tenth day of the disease received one or two laxative doses of calomel. The bath was given every three hours; as long as the temperature—taken in the mouth or axilla—was 101.5° F. (38.6° C.). One case of the series suffered a relapse, another two relapses. Intestinal haemorrhage occurred in 2 cases. Upon the supervention of haemorrhage bathing was discontinued. The average number of baths in each case was 42; the smallest number was 10; the largest, 138. Complications were insignificant. There were no sequelæ.

Lyonnet and Chatin²¹¹ _{Dec. 7, '90} have reported a series of 53 cases of typhoid fever, of which 49 were treated by means of baths, in accordance with the method of Brand; the 4 not so treated were mild. There was but 1 death; that occurred in an obese woman, 48 years old, who entered the hospital on the eighteenth day of the disease in a condition of extreme adynamia, presenting marked dyspnoea, delirium, and intestinal haemorrhage. She died, in collapse, eight days after admission.

Bouveret²¹¹ _{Apr. 16, May 1} reported 100 cases of enteric fever treated by means of cold baths with but 3 deaths; 38 of the cases were in males, 62 in females. Lacour,²² _{Apr. 25} in the case of a girl 11 years old, gave 327 cold baths. Sihler²²² _{Mar.} is also an ardent advocate of cold baths.

Chauffard³ _{Sept. 30} maintains that, while the internal administration of antiseptic agents neutralizes the development of the toxic products of the activity of the typhoid bacillus, upon which the myocarditis of enteric fever depends, the systematic employment of cold baths in treatment exerts a prophylactic influence by favoring the elimination of the toxic matters. When the myocarditis has developed the baths are not to be suspended; they should be cautiously continued, and the heart supported by caffeine,—administered by the mouth and subcutaneously.

To remove the possibility of chill and shock, and to overcome the repugnance and mental distress of the patient, in connection with the cold bath, Hodson²⁶⁷ _{Mar. 1} proposes the graduated bath as a substitute. When the patient once comfortably rests in the bath, a current of cold water can be slowly introduced, so as to gradually reduce the temperature.

Seibert⁵⁹ _{Sept. 12} ascribes the utility of flushing the colon at regular

intervals to the cleansing effect, as a result of which the bowel is relieved of the accumulation of bacteria and toxic products.

Roque and Weill ⁹² found that, in cases treated without medication, the urotoxic co-efficient of the urine was double the normal co-efficient, but the elimination of toxines was incomplete, as it continued during convalescence, the hypertoxicity of the urine persisting for four or five weeks after the cessation of the fever. In cases treated by cold baths the urotoxic co-efficient became five or six times greater than normal. This excessive elimination of urinary toxines diminished as the general symptoms ameliorated and as the temperature declined. With the appearance of apyrexia and the setting in of convalescence the urotoxic co-efficient became normal. It thus appears that the cold bath is not a specific in the treatment of enteric fever; neither does it exercise any influence upon the production of toxines.

In regard to surgical treatment for perforation, Fitz ⁹⁹ states that it would seem to be wisest to wait until a probably encapsulated exudation proves unduly slow in being absorbed. Immediate or early laparotomy seems advisable only when the condition of the patient is exceptionally good. Should the signs indicative of exudation persist for a week or longer, and should the general condition of the patient permit an incision, surgical treatment may be undertaken.

AN ANOMALOUS FEVER.

Whitelegge ²,₂₁ reported an epidemic of an obscure form of fever that occurred in a prosperous English town of about 5600, most of whom were engaged in woolen and worsted work. Within a week of the time when the first cases were observed 100 mill-hands were down with the fever and 4 had died; but the disease was not confined to the mill-hands. No cause for the epidemic could be found in the water-supply or in the drainage. Among the workers in the mills the fever was most common in those less than 18 years old; in females; in the employés of one mill; and in those who worked upon the upper floors of the mill, especially in hot rooms. The dining-room in the mill was used by 170 persons, who brought their dinners with them; 100 took their meals in the work-rooms; and 340 went home or to eating-places. Among the first there were 30 cases; among the second, 5; and among the third, 9. Thus, those who took their meals in the

dining-room constituted but 28 per cent. of all, while they contributed 70 per cent. of the cases. The wool could not have been the source of contagion, because the sorters, who handled it first, escaped entirely; nor could the food have been at fault, for each brought his own. There were some 200 cases in those not employed in the mill. Some of these were undoubtedly cases of enteric fever; the larger number, however, resembled typhus, though in none was the rash seen. They were, for the most part, in young persons or children. The period of incubation was about a week; the attack set in suddenly, with fever and headache. There was much delirium, but no diarrhoea. The duration was generally from a few days to a week; some cases were prolonged to the second or third week; in these there were pulmonary complications; only 2, however, developed acute pneumonia. The total number of deaths was 18, of which only 2 were in cases that had been employed at the mill. It was impossible to obtain a single post-mortem examination.

In the discussion, Wynter Blyth² stated that recent researches had demonstrated the existence of several distinct forms of disease hitherto included in the designation of enteric fever. The ulceration of Peyer's patches might be caused by various microbes, and was, therefore, a common condition or accident, and not pathognomonic of one specific disease. Enteric fever will thus, ere long, have to be subdivided into several fevers, of which he thought this was one, as were other so-called anomalous forms. Meanwhile, the term "continued fever," though an expression of ignorance, should be retained for those cases in which the symptoms of true enteric fever were wanting. H. E. Armstrong said that, in twenty years of sole charge of a fever-hospital, he had found typical cases of enteric fever to be the exception, especially of late, and he had been in the habit of describing a large group as typho-enteric. Anomalous forms of typhus, on the other hand, were far less frequent, though intestinal haemorrhage was occasionally met with even in typical cases.

ENTERIC, OR TYPHOID, FEVER.

(From the ANNUAL for 1893.)

Incidence.—Von Fodor,¹²⁶ of Budapest, has reported an epidemic of enteric fever, in a Hungarian community of 34,000 inhabitants, living on the side of a mountain, in which 1228 persons were attacked and 93 (7.5 per cent.) died. The preceding summer had been hot and dry. Late in October there was a copious fall of rain. Cases of enteric fever began to accumulate in the first week of November; the number became greatly increased in the second and third weeks, but thereafter rapidly declined. In the following February, after the melting of the snow upon the surface, the epidemic again broke out with renewed violence, and continued for several weeks. It was observed that only that portion of the community was attacked that used water brought from a mountain-spring through pipes of primitive and defective construction. The people were instructed to boil all water intended for use, and in this way the magnitude of the epidemic was in some degree held in check. Bacteriological examination, made at the close of the first part of the epidemic, failed to disclose the presence of typhoid bacilli in the spring-water; but during the second epidemic it was possible by culture to find a number of bacilli the characteristics of which, in all essentials, agreed with those of typhoid bacilli.

Guimbretière, of Boussy,¹²⁷ has reported an epidemic of enteric fever in the course of which eighty-five persons were attacked and thirteen died. All but two of the affected persons had partaken of water obtained from a well connected with the church in the village and which was found to contain typhoid bacilli. The two exceptional cases had assisted in the nursing of other persons suffering from enteric fever. The husband of one of these developed enteric fever six months later, after the epidemic had subsided, at a time when there were no other cases of the disease in the village. The so-called well proved to be but a cistern into which the rain-water and some overflow water percolated. The church itself occupied the site of an old cemetery. In the winter preceding the occurrence of the outbreak there had been a sudden thaw, numerous fissures forming in the ground;

and it is thought that the noxious matters were thus carried into the well from which the disease-breeding water was obtained. Reid ^{Apr. 2} has reported the occurrence of seven cases of enteric fever in persons, of whom six came into relations with a farm, in the house on which, a year previously, there had been a case of enteric fever. All drank of water obtained from a well in close proximity to the privy-well, into which had been thrown the dejecta of the patient of the previous year. The view is expressed that the sudden outbreak was the result of renewed vitality on the part of the specific cause of the disease, and not of evolution.

Egbert, of Philadelphia, ^{May 112} has reported the results of an investigation of an epidemic of enteric fever, in a small manufacturing community of 300 inhabitants in the southern portion of North Carolina, in the course of which 53 persons were attacked and 10 died. There had been no cases of enteric fever in the community prior to the advent of a family that came to find employment, one member of which was ill, probably with enteric fever; soon afterward the epidemic broke out. Inquiry showed that no special provision was made for drainage. There were no cess-pools, privies alone being used; the solid excreta being removed at monthly intervals. The water-supply was obtained from wells. The soil of the village was porous. The epidemic was brought to an end by boiling the water intended for use, and subsequently providing a water-supply obtained from a source free from the suspicion of contamination, with the reception of the dejecta into tightly-closed boxes, which were removed and emptied twice a week.

Caton, of Liverpool, ^{Nov. 28, '91} ² calls attention to a possible means of dissemination of enteric fever from the employment of liquid manure obtained from cess-pools in the cultivation of lettuce, celery, and allied vegetables.

Mitchell, of Cincinnati, ^{May 14} ⁵³ has reported the occurrence of twelve cases of enteric fever in persons who had drunk milk from a common source, four of the cases being in members of the family of the dairyman from whom the milk was obtained, and who, it was known, diluted the milk with water. At the dairy, the milk-cans were washed with water obtained from a well near a stable. Two of the sick men had been cared for by men who assisted in the milking. Turner ^{Aug.} ¹⁵ has reported the occurrence of

an epidemic of enteric fever, the origin of which could not be traced to the milk-supply or the water-supply. Inquiry, however, elicited the fact that all of those that were attacked were in the habit of eating ice-cream obtained from a number of itinerant Italian vendors, in the families of some of whom the disease likewise appeared; while all that took no ice-cream escaped. It could not, however, be ascertained by what agency—whether by milk, or ice, or water—the infection was transmitted.

While admitting that, in perhaps 90 per cent. of cases of enteric fever, the specific infection is transmitted through water, Sicard,³ maintains that, in the remainder, the transmission occurs through the air. By having patients with enteric fever breathe several times for several minutes through curved tubes into water that had been boiled and sterilized, keeping this fluid for forty-eight hours at the temperature of the body, and inoculating various culture media, it was possible to demonstrate the presence of typhoid bacilli in the air expired. The conviction is also expressed that the bacilli thus exhaled may be inspired by other persons, finding lodgment in the air-passages and being taken up thence into the blood-current.

Etiology.—Arloing²¹¹ has reported the results of a study of the bacillus coli communis and the bacillus of Eberth made by Rodet, Roux, and Vallet. In an examination of the water of a community in which one hundred and nineteen of two hundred and fifteen persons were attacked with enteric fever Rodet found an organism that possessed almost all of the characteristics of the bacillus of Eberth, both in cultures and on microscopic examination. Cultivated for several generations and upon different media, the organism presented a polymorphism, in consequence of which it sometimes resembled the bacillus coli communis and at other times the bacillus of Eberth. Examination of two other waters used by communities in which enteric fever was prevalent disclosed the presence of organisms that resembled the colon bacillus more closely than the bacillus of Eberth. Roux made a corresponding observation. Rodet and Roux now studied the stools of a number of enteric-fever patients, and found some cases in which only the colon bacillus was present in the stools, and other cases in which the bacillus of Eberth was found in the spleen and the colon bacillus in the intestines. It was not possible to make a dis-

tinction between the two organisms, from a study of their morphology, biology, or pathogenicity. Rodet and Roux found that an old bouillon culture of the colon bacillus presented, in culture upon potatoes, the delicate film described as characteristic of the bacillus of Eberth, while the bacillus of Eberth obtained from the spleen presented a coarse growth like that of the colon bacillus. Colon bacilli from old cultures did not stain more readily than the bacilli of Eberth. The bacillus coli communis may, like the bacillus of Eberth, decolorize gelatin that has been stained with fuchsin. The bacillus coli communis, when kept in the presence of carbolic acid or when passed through guinea-pigs, may be as actively motile as the bacillus of Eberth. Both organisms are subject to variations in form and size. The bacillus coli communis could be made to resemble the bacillus of Eberth by keeping the culture for some time, by heating the organism at a temperature of 176° F. (80° C), and by cultivating it at a temperature of from 111.2° F. (44° C.) to 114.8° F. (46° C.). Roux found, in the rose-spots of a case of enteric fever, an organism that in culture presented an appearance intermediate between that of the colon bacillus and that of the bacillus of Eberth. The conclusion is arrived at that the bacillus coli communis and the bacillus of Eberth represent two species of the same organism, and that the human economy favors the transformation of the colon variety into the Eberth variety. Vallet has observed that the colon bacillus survives longer and multiplies more rapidly in the stools than does the bacillus of Eberth. Rabbits, to which were given water soiled by faecal matter, resisted inoculation with cultures of both the bacillus of Eberth and the colon bacillus.

Petruschky⁵⁸ Aug. 30 has studied anew the question of the action of the bacilli of enteric fever upon lower animals, and has found that it is not truly pathogenic, in the sense that inoculation with small quantities is followed by enormous multiplication; it is, however, possible, by subcutaneous and intra-peritoneal injection of definite quantities of bacilli, to induce illness in the animals and to cause fatal intoxication. Bacilli of enteric fever, introduced into the peritoneal cavity in numbers not too small, may multiply quite considerably upon the serous covering of the abdominal viscera. Multiplication in the texture of organs was, however, not observed. It could not be definitely determined whether the

formation of toxic matters took place only in the body of the animal or in the cultures as well. The appearance of symptoms immediately after the injection is suggestive of the formation of the toxic matters in the culture.

In addition to marked leucocytosis, Thoinot and Calmette ²²¹ found in the blood obtained from the finger-tip and from the spleen, in a large number of cases of typhus fever during an extensive epidemic, a large number of micro-organisms appearing as refracting granules 1 or 2μ in diameter, with processes from 3 to 5 or 10μ long, and terminating in small swellings, suggestive of spores. The organisms are actively motile, and move about like the spirochetae of relapsing fever. At the end of several hours the processes increase in length and assume a spiral outline.

Immunity.—Stern, of Breslau, ²²² has made a study of the blood-serum in seven cases of enteric fever. The questions that he endeavored to solve were: 1. Is the bactericidal activity of the blood to the typhoid bacillus increased in persons that have recovered from enteric fever? 2. Has the blood of such persons any curative action upon animals inoculated with typhoid bacilli? 3. Has this blood the property of neutralizing the poisons generated by the typhoid bacillus? In the cases studied the blood was examined at various intervals after convalescence had set in: a week and five and a half weeks, respectively, after the last day on which fever had appeared; in another on the fourth, in a third on the sixth, afebrile day; in a fourth, five days, in a fifth case, a week after defervescence; in a sixth, on the fifth afebrile day; and in the seventh patient, who was under treatment for alcoholic neuritis, the attack of enteric fever had occurred seventeen and a half years before. It had previously been demonstrated that the human blood (defibrinated blood or blood-serum), as well as the fluid found in exudates and transudates, possesses the property of destroying typhoid bacilli. No difference was found to exist between the blood of patients suffering with an attack of enteric fever and the blood of healthy persons. It was found that, in five of the cases that had recently recovered, the bactericidal activity of the blood-serum to typhoid bacilli was distinctly diminished; no variation from the normal activity was found in the blood-serum of the patient that had had an attack seventeen and a half years previously. White mice, treated with a mixture of typhoid bouillon

and the serum of a healthy person, succumbed after the same interval as animals treated with the same quantity of typhoid bouillon alone, while mice treated with a mixture of typhoid bouillon and the blood-serum from four of the cases recently convalescent from an attack of enteric fever survived; in one case the animals died, but death was notably deferred; in the sixth case, and in that in which the disease had occurred seventeen and a half years previously, no influence upon the fatal termination was observed. It was demonstrated that an otherwise lethal quantity of a sterilized extract of typhoid cultures could safely be injected into animals, in the proportion of 1 to 1 or of 1 to 2, if the extract were mixed with the blood-serum from three of the recent convalescents.

Morbid Anatomy.—Hervouët¹²⁷ has reported the case of a woman who had presented symptoms of enteric fever for several days. Convalescence set in apparently early, when suddenly dyspnœa developed, the temperature rose, pain in the abdomen appeared, and death soon followed. At the post-mortem examination numerous Peyer's patches in process of cicatization were found in the small intestine; no ulceration was present. The large intestine, on the contrary, presented a large number of ulcers. The spleen was enlarged and diffused; the liver was large and fatty; the kidneys were also large. The lungs were congested in places, in other places presenting areas of broncho-pneumonia; at the apices were the cicatrices of ancient tuberculosis, but nowhere were there recent tubercles. The opinion is expressed that the primary infection involved the small intestine, the process in the large intestine being secondary. As a result of a careful study of the peculiar nodules that develop in the liver in the course of enteric fever, Moroni⁴⁶⁰₁₈₈₁; ⁴¹_{Aug. 1} concludes that they are produced by the bacillus of enteric fever, which may occasion a coagulation necrosis, affecting the protoplasm of the cell, the nucleus escaping; or a collection of movable cells, intermixed with the detritus of nuclei; or a perilobular infiltration of movable cells; or pyrogenetic manifestations.

Clinical.—Mason, of Boston, ⁹⁹_{Ap. 7, 1891} gives the statistics of 676 cases of enteric fever admitted to the Boston City Hospital during the years 1890 and 1891. Seventy cases terminated fatally—10.4 per cent. The largest number of cases were admitted in the months of September (165), October (139), and August (97). The largest

number of cases occurred in persons between 20 and 25 (207, with 25 deaths—12 per cent.), between 25 and 30 (137, with 9 deaths—6 per cent.), and between 15 and 20 (120, with 13 deaths—10.8 per cent.). The mortality was lowest in children and highest in persons older than 30. The later that the patient came under observation, the more unfavorable was the course of the case. Fifteen patients died within three days after admission to the hospital. Of the total number, 445 cases were in males and 231 in females. Of the males, 43 (9.6 per cent.) died; of the females, 27 (11.6 per cent.). Intestinal lesions, perforation, and haemorrhage were more commonly the cause of a fatal issue in males (4 per cent.) than in females (2.6 per cent.). Intestinal perforation occurred in 9 cases, of which 6 were in males and 3 in females. Haemorrhage from the bowels took place in 32 cases, of which 25 were in males and 7 in females; 14 of the cases terminated fatally. There were 7 cases of pulmonary tuberculosis, all of which terminated fatally. Pneumonia appeared in 34 cases; in 28 recovery took place; in 6 death. Eleven cases were complicated by pleurisy; 3 terminated fatally. Bronchitis was present as a severe symptom in 74 cases, in 2 determining a fatal issue. Pulmonary oedema was present in a marked degree in 25 cases, of which 10 terminated fatally. Albumen and tube-casts appeared in the urine in 60 cases: in 3 of these there was chronic nephritis, which led to a fatal termination; in 12 others that terminated fatally there was acute nephritis. There were, besides, many cases of febrile albuminuria. In 12 cases there was chronic valvular disease of the heart; death took place in 2. Two cases presented acute endocarditis; death took place in 1. One patient had acute fibrinous pleuritis and pericarditis and acute nephritis. Diarrhoea was present in about half of the cases, but was the chief cause of exhaustion in only 5. Hyperpyrexia was noted in but 3 fatal cases, 2 of which were in males and 1 in a female. The highest temperature recorded was 108° F. (42.2° C.). Alcoholism was one of the gravest sources of danger in a large number of cases, and was no doubt responsible for many of the cardiac, renal, and pulmonary complications that contributed to fatal exhaustion. Delirium tremens was present in 8 cases, of which 5 terminated fatally. Of 2 cases of parotiditis, death took place in 1. Pregnancy existed in 7 cases: in 4, recovery ensued without abortion; in 1, abortion

occurred at seven months, the child living and the mother recovering; in 1, death resulted from pneumonia, without the occurrence of abortion; in 1, a fleshy mole existed and septicæmia developed and perforation occurred. Thrombosis of the iliac or femoral vein was observed in 19 cases, in 4 of which death took place; in 2 from consequent embolism of the pulmonary artery, and in 2 from exhaustion. Peripheral neuritis occurred in 21 cases. In 2 post-typhoid insanity developed. Purulent otitis was recorded in 22 cases. Symptoms of appendicitis were present in 1 case, which ended in recovery. Relapses took place in 100 cases; in 3 cases, there were 2 relapses; in 2 cases, 3 relapses. Four deaths occurred in relapses. In 35 cases the initial pyrexia did not fall to the normal for thirty days or more, and in 9 cases it continued without subsiding for more than forty days. The treatment consisted principally in cold sponging and affusions, with the internal administration of antipyretics, antiseptics, and tonics, and the employment of such other dietetic, stimulating, and symptomatic measures as the individual case seemed to require. In conclusion, a preference for hydro-therapeutic measures is expressed, of which the full bath of Brand is considered to be the most efficient and convenient.

Moussous ²⁵_{No. 4; July; June 4} ¹¹⁸ ² reports the observation of 50 cases of enteric fever in children under the age of 15 years, of which 3 died. Cinchonine, quinine, purgatives, repeated every second day until the twelfth day, enemata night and morning, and a generous milk-diet constituted the treatment. Naphthol was administered to children capable of swallowing tablets. The graduated cold bath was reserved for cases attended with nervous manifestations or with hyperthermia. In 1 child, previously in apparently perfect health, the attack set in with great abruptness. In 2 cases the onset was attended with vomiting, which persisted for eight or ten days; in 2 others, gastric symptoms were prominent, with absolute anorexia. In 3 cases the type of the disease was ataxic. One child, 4 years old, developed a spleno-typhoid. In 2 cases grave syncopal symptoms appeared; recovery occurred in both. One child died on the twentieth day (convalescence having almost set in), in consequence of attempting to rise to drink a cup of milk; at the autopsy the cause of death remained undetected. Among the complications were: phlegmasia alba dolens in a fatal case in

a child of 2 years; great dilatation of the colon in a boy of 9 years; neurasthenic symptoms in a girl of 13 years, of neurotic tendencies. Relapses took place in 5 cases. Comparatively, although the febrile movement was higher, the symptoms were less alarming, and the grave complications less common, than in adults. The disease was more severe in children under 2 years old than in older children. The explanation of this and of the other fact, that enteric fever is relatively milder in children than in adults, lies in the less rapid development of the typhoid bacilli in the intestines, on account of the activity of the digestive functions, the more rapid elimination of toxic matters through the greater functional activity of the liver and the kidneys, and the intense phagocytosis favored by the development of the lymphoid structures. Among other things, it was found that the toxicity of the urine was normal or increased during the pyrexial period; that it was augmented with the setting in of defervescence, and for several days afterward; and that, after several days of apyrexia, the toxicity became normal, or even sub-normal. A discussion on enteric fever in children was held at the meeting of the American Pediatric Society.⁹⁹ Northrup, of New York, maintained the extreme rarity of the disease in children under 2 years of age. He stated that not a case had been observed in twenty years at the New York Foundling Hospital. Suspected cases had, upon post-mortem examination, proved to be instances of something else. Many children less than a year old, reared in institutions, after death present pathologically the lesions of enteric fever,—swelling of Peyer's patches, sometimes with ulceration; swollen mesenteric glands; enlarged spleen. Bacteriologic examination, however, fails to disclose the presence of typhoid bacilli. Earle, of Chicago,⁹⁹ reported 20 cases of enteric fever in children (10 males and 10 females), occurring in a community in which enteric fever had previously been comparatively rare. There were no deaths. The children varied in age from 2 to 15 years. The duration of the disease averaged 26 days, varying from 17 to 45. There was slight diarrhoea in 10 cases, severe diarrhoea in 7, and constipation in 3. Vomiting was present in a small percentage of cases. Tympanites was present in a considerable number. In 1 case inflammation of the deep femoral vein occurred. In 1 case parotiditis was a complication. Epistaxis was present in 11 cases. Bronchitis attended almost all. In none did intesti-

nal haemorrhage occur. Rose-spots were observed in every case but one that was seen late. The spleen was enlarged in 14 cases. Pain in the abdomen was almost universally present. Pain in the head was usually complained of by the older patients. Impairment of speech was common. In 1 case complete deafness persisted for two or three weeks. Otitis developed in 1 case. The severe cases presented nervous manifestations. In 2 cases convulsions occurred. Periostitis developed in 1 case. In 5 cases relapses occurred, lasting for from fifteen to twenty days. Christopher, of Chicago, ⁹⁹ _{May 19} related that he had seen what seemed to be mild cases of enteric fever in infants, but, owing to the invariable recovery, the diagnosis could not be confirmed. The symptoms commonly observed were: flatulence, enlargement of the spleen, roseola, pulmonary phenomena, and a peculiarly-coated tongue.

Fuller, of London, ⁶ _{Nov. 7, 91} has reported a case of enteric fever in an infant 9 months old. The child had been listless, and had refused food for ten days; diarrhoea had been present but for a day; the stools were thick and yellow. The skin was dry and hot; the temperature was 102° F. (38.89° C.). The tongue was dry and furred. The abdomen was tympanitic; deep pressure seemed to cause pain. No spots could be detected. Death took place on the third day after the child came under observation. The brain was found congested, with an excess of fluid in the ventricles. Heart, liver, kidneys, spleen, and stomach were normal. The small intestine was red in the neighborhood of Peyer's patches, which were inflamed and elevated above the level of the surrounding surface; some of the lower ones were commencing to break down. The mesenteric glands were enlarged and the solitary glands of the cæcum were abnormally prominent. Another child in the same family and a woman in the same house presented corresponding symptoms.

Ogle, of London, ⁶ _{Jan. 2} has reported a fatal case of enteric fever in an infant 4½ months old. The child had been well until vaccinated, six days before death, when vomiting set in. On the day of death the child was fretful, and vomited several times. A stool passed was solid and lemon-colored. At the autopsy evidences of rickets were found. The vertex of the brain was ecchymosed, and the left lateral ventricle contained an excess of fluid. Peyer's patches were swollen and reticulated,

and many, especially in the lower part of the ileum, were converted into ragged ulcers. The mucous membrane of the colon was covered with minute, inflamed, solitary glands, which were ulcerated in the ascending portion. The mucous membrane of the stomach was healthy. The mesenteric glands were enlarged. The spleen was large and soft.

From a study of a collection of cases, Albouze²¹² Sept. 10 has arrived at the conclusion that, in the large majority of cases of enteric fever in children, the tendon reflexes are enfeebled during the acute stage of the disease and exaggerated during convalescence. This observation may afford prognostic indications. The phenomena are thought to be dependent upon organic or functional changes in the spinal cord. Watkins, of Hill City, Tenn.,¹⁹⁹ Jan. 2 has reported a case of enteric fever in a patient over 60 years old.

Symptomatology.—Wendland, of Berlin,⁴¹ Aug. 29 reports two cases of afebrile enteric fever in which the correctness of the diagnosis was verified by the findings of the post-mortem examination. The practical conclusion is that the absence of febrile movement in a case in which the other symptoms are sufficient to make a diagnosis does not suffice to exclude enteric fever. In regard to prognosis, it is evident that the elevation of temperature is not a true index of the severity of the case. In uncomplicated cases, a fatal result is not to be anticipated from pyrexia alone; so that antipyretics may ordinarily be dispensed with. Carrieu²⁰⁸ No. 22, 1891; July 18 has observed that, in some cases of enteric fever, the pulse is remarkably slow in proportion to the elevation of temperature. The condition is to be distinguished from threatened collapse dependent upon cardiac failure. It is probably dependent upon a toxic influence acting upon the pneumogastric nerve, and is not associated with a myocarditis.

Finley²⁰² Aug. describes the case of an iron-roller, 21 years old, who was admitted to the Montreal General Hospital on the thirteenth day of an attack of enteric fever, presenting a copious eruption of rose-spots on the abdomen, chest, back, and buttocks; the spots were less abundant, but numerous upon the forehead, arms, and legs. Individual spots were found to persist for from three to five days, and a few fresh spots came out on areas of skin that had previously been clear. The disease pursued a mild course.

Diagnosis.—With a view of determining the diagnostic value of Ehrlich's urinary test (see the ANNUAL for 1890, vol i, H-37), Edwards, of Chicago,⁹ made a series of 600 urinalyses in a large number of medical and surgical cases. Of 130 cases of enteric fever, the reaction was absent in 2 undoubted cases. The intensity of the reaction bore no relation to the termination of the case. The length of time during which the reaction was present could not always be determined, but in 63 cases this averaged thirteen days. The reaction bore no relation to the temperature, though most intense at the fastigium. It did not always disappear when the morning temperature became normal. The pyrexia usually persisted longer than the reaction, but in 17 cases the reaction was obtained after the fever had disappeared. It was present in 6 of 19 cases of enteritis or febricula; in 3 of 5 cases of malarial fever; in 25 cases of various forms of tuberculosis (absent in 5); in cases of rheumatism, nephritis, diabetes, carcinoma, syphilis, cardiac lesions, pneumonia, plumbism, cerebral haemorrhage, septicaemia, arthritis, neuritis, gastritis, purpura, abscess, meningitis, cirrhosis of the liver, cholangitis, intestinal obstruction, and intussusception. The following conclusions are arrived at:—

1. The reaction is independent of any single disease or any group of diseases.
2. It is frequently found in urine containing albumen, peptone, biliary substances, sugar, aromatics, and possibly leucomaines or ptomaines.
3. More constant results were not obtained with the absolute alcohol than without its use.
4. Ehrlich's reaction is not always present in enteric fever, even at the acme of the disease. It is, therefore, at best only presumptive, and not positive, evidence of enteric fever.
5. Together with more reliable signs and symptoms, as temperature, enlarged spleen, etc., it may contribute to a diagnosis of enteric fever; and conversely, when absent, in 98½ cases out of 100, the disease is other than enteric fever.
6. It is found in many other diseases, some of which, in certain clinical features, may simulate enteric fever,—e.g., septicaemia, uræmia, tuberculosis in its varied aspects (intestinal, peritoneal, miliary, etc.), as well as enteritis, malaria, and pneumonia. In differential diagnosis, therefore, when other distinctive symptoms are lacking, the sulphanilic-acid test is untrustworthy. It fails when most keenly wanted, and may be absent in otherwise typical typhoid fever.
7. If much reliance is

placed on the test, a relapse of enteric fever may be confounded with complications. Among the complications and early sequelæ that yield the reaction are acute nephritis, lobar pneumonia, pulmonary tuberculosis, pleurisy, etc. 8. Inasmuch as it occurs typically in many diseases in which the causes and elaborated products differ, and as the various compounds with which diazo-benzene-sulphonic acid unites are as yet unknown, the reaction cannot commend itself to the scientific chemist, however it may be regarded clinically.

Sottas, of Paris,³¹ calls attention to the fact that, while acute pulmonary tuberculosis frequently simulates enteric fever, it is uncommon for the latter to simulate the former. He reports a case that presented considerable difficulty in diagnosis. Slight cough was present, with sanguinolent expectoration, impaired percussion resonance at the bases of the lungs, enfeebled breathing, friction sounds, and fine râles,—some moist, some dry. Slight epistaxis occurred; ill-defined rose-spots appeared; the bowels were constipated. Tubercl bacilli, however, could not be found in the sputum. Defervescence, too, took place at the usual time, and the pulmonary phenomena entirely cleared up.

Complications, Intercurrent Affections, Sequelæ.—Bouveret, of Lyons,²¹¹ has reported four cases in which, in the periods of defervescence of enteric fever, a chill would suddenly manifest itself, followed by elevation of temperature and sweating. The paroxysm was repeated at uncertain and irregular intervals, once or oftener, the patients appearing to be well in the intermissions. The manifestation was found to be related to no complication or intercurrent or secondary affection, and malarial poisoning could be excluded. In explanation of the occurrence, the view is expressed that, under ordinary circumstances, the toxic matters generated in the course and as a part of the primary disease are slowly eliminated, and gradually find their way into the circulation; under other circumstances, that cannot be clearly defined, however, a large volume of these toxic matters is thrown into the blood at once, and the peculiar and unusual symptoms appear as a consequence. The condition is not a dangerous one, although at times an alarming one.

Fränkel, of Lyons,²¹¹ has reported a case of enteric fever in a recently-married woman of 19 years, who had shortly before

returned from Italy. Baths were advantageously employed in treatment. Intestinal haemorrhage, however, took place. The primary attack was followed by a relapse. During the period of defervescence a chill suddenly occurred, followed by elevation of temperature and sweating. Spleen and liver were enlarged, and the latter was tender on pressure. The stools presented no abnormality, and the urine contained no albumen. A bed-sore had formed. No other complications could be detected. An examination of the blood was not made. The paroxysms were repeated for several days. The patient ultimately recovered. In seeking for an explanation of the periodic febrile exacerbations, it is admitted that these might have been due to malarial intoxication, but the view is expressed that it is more likely that at the time of the occurrence of the haemorrhage a thrombus formed in one of the mesenteric vessels, in which suppuration subsequently took place, and secondarily to which miliary abscesses formed in the liver.

Rioblanc ²⁴³ _{Nov., Dec., '91} has reviewed the nervous complications and sequelæ of enteric fever. These may appear at any period of the attack—with the invasion, at the height, in the decline, in convalescence, or subsequently. Thayer ⁷⁶⁴ _{Jan., Feb.} has reported a case in which, during convalescence from a mild attack, symptoms of melancholia developed, with well-defined delusions. Donkin ⁶ _{Apr., '91} relates the case of a woman, 30 years old, who had been nursing two cases of enteric fever in a house in which the drains were believed to be defective. One of these cases pursued a severe course, being attended with profuse, fetid diarrhoea and terminating fatally. Symptoms of enteric fever appeared in the nurse while yet on duty. In the course of the attack signs of diffuse bronchitis appeared. At the end of a month the attack was apparently at an end. The patient complained of headache. At about this time it became necessary to administer an enema for the relief of constipation. The patient was found with consciousness much impaired and an inability to articulate. The left eyelid drooped and the right arm and leg were paralyzed. The patient apparently heard and understood what was said to her. The tongue was protruded in the median line. Swallowing was difficult, and there was incontinence of urine. In the next few days the paralysis became complete, and there was considerable loss of sensibility in the affected extremities. The breathing was labored,

and faecal incontinence was added. The temperature rose, fresh spots appeared, the bowels became loose, and vomiting set in. The symptoms continued for several days, and were followed by a fatal termination. At the post-mortem examination the left carotid artery was found occluded by a soft, dark clot, that extended to all of the principal branches, the middle cerebral artery being apparently the most affected, and the clot confined to the fissure of Sylvius. The area supplied by the middle cerebral artery was extremely disorganized, the softening involving especially the left corpus striatum, the island of Reil, the operculum, the anterior fourth of the upper internal temporo-sphenoidal convolution, the whole of the anterior cornu, and the wall of the lateral ventricle as far back as the front of the optic thalamus. The thalamus itself was softer than normal, principally in its outer part. At about the middle of the anterior edge of the lower lobe of the left lung was a faintly-yellow infarct about as large as a walnut. The corresponding pulmonary arteriole was occluded by a soft, dark clot. There were evidences of a general bronchitis. The pleura was smooth. The heart and peritoneum were normal. The mesenteric glands were large, soft, and blood-stained. The spleen was large and soft. Two large recent ulcers were found in the ileum; others were in process of cicatrization; some small, recent ulcers were found in the ascending colon. Newbolt, of Ellesmere Port, ⁶ has reported the case of a locomotive-fireman, 21 years old, in which, in the course of a relapse of enteric fever, loss of power appeared in the left arm and leg. Speech was interfered with, and the tongue, in being protruded, deviated to the right. The right eyelid drooped, and swallowing was difficult. Several haemorrhages from the bowels took place, and the patient was threatened with collapse. For a time sensation was absent in the left upper and lower extremities. After a time the patient slowly improved, but perfect restoration of function failed to take place. The opinion is expressed that the condition was dependent upon the occlusion of one of the cerebral arteries by an embolus swept from the heart, or by the formation of a thrombus *in situ*.

Bury, of Manchester, ⁹⁰ has gathered from literature a number of cases of enteric fever, in which motor and sensory and symptoms suggestive of peripheral neuritis appeared during or subsequently to the pyrexial period, and reports two additional cases.

An analysis of the symptoms present shows that the paralysis is usually partial in extent and degree. In all probability the neuritis, of which the motor and sensory symptoms are manifestations, is the result of a toxic influence exerted by the poisons generated in the course of the disease with which they are associated. Potts, of Philadelphia,¹¹² _{Sept.} has reported the case of a boy, 16 years old, who, during convalescence from an attack of enteric fever, followed by relapse, suffered with shooting pains in both legs, which were sensitive to touch. On attempting to walk, it was noticed that the feet dragged. There was complete loss of power in the anterior tibial and in the peroneal muscles of the left side; complete foot-drop, the toes of the foot being dragged; some weakness of the muscles on the right side; and slight tenderness on pressure over the anterior tibial nerve on the left side. Sensation was unimpaired. Electric examination disclosed the existence of the reaction of degeneration in the muscles supplied by the left anterior tibial nerve. On the right there were quantitative, but no qualitative, changes. By the employment of galvanism and the administration of strychnine, improvement slowly took place, until there remained only some difficulty in raising the left great toe.

Rosenberry, of Menominee, Mich.,²³³ _{May} has reported two cases of what he believes to have been enteric fever, in which, during the period of convalescence, acute pain of sudden onset manifested itself in the praecordia, over a considerable area, as well as in the left shoulder and arm—symptoms which he considers as those of angina pectoris. It is suggested that the condition was dependent on changes in the heart-muscle induced in the course of the fever. Korczynski and Gluzinski, of Cracow,⁷⁸³ _{1881, 2, Apr. 23} ⁸⁴⁴ have reported the occurrence of a greatly increased mortality in a number of cases of enteric fever that were placed in a ward which for many years had been occupied by surgical cases, but which, after thorough cleaning and painting, had remained unoccupied for three months. Of 9 cases, 4 died. In 1 case, diphtheria of the pharynx and phlegmonous inflammation of the larynx developed; in another, destructive ulceration of the epiglottis took place, with extensive inflammatory œdema of the subcutaneous tissues of the neck and of the submaxillary and parotid glands; in 3 cases, pyæmia with multiple abscesses appeared; in 3 cases in which recovery took place, suppurative inflammation of the middle ear occurred.

Neither in the pus found after death nor in that of the cases of otitis media were typhoid bacilli to be found; only the ordinary pyogenic cocci were present. Bacteriologic examination of the dust upon the walls and of the air of the ward in which the patients had been placed disclosed the presence of staphylococci and streptococci.

Hanquet⁴⁵⁴ has reported the case of a militiaman, who, in the fourth or fifth week of an attack of enteric fever, as convalescence was apparently about to set in, presented symptoms suggestive of the existence of acute septicæmia. First, the right lower extremity became œdematosus, probably as a result of thrombosis of the femoral vein. Then a painful swelling appeared on the external aspect of the left thigh, in all probability as a result of a periostitis of the femur. At the same time a large abscess formed in the left axilla, which was incised and evacuated. Finally, a few days later, a painful swelling made its appearance at the upper portion of the right forearm, on its ulnar aspect. The greater part of the ulna became enlarged, the adjacent soft parts likewise participating in the swelling. Soon a sinus formed, giving vent to sanious pus. As, after a reasonable lapse of time, the condition displayed no tendency to heal, the parts were laid open and a sequestrum of bone was removed. It was not long thereafter that the patient was free of all complications. Clark, of Glasgow,⁴⁵⁵ observed the case of a laborer, 28 years old, in which the temperature began to be irregular on the twenty-sixth day of an attack of enteric fever, remaining, however, pyrexial. On the thirtieth day the right cheek presented slight bulging, and on the following day the right eye was completely closed, the upper and lower lids being greatly swollen. On the thirty-third day the left eye became involved, both lids swelling immensely. On the thirty-fifth day large non-glandular swellings formed at the angles of the lower jaw. By this time the outer half of the right upper eyelid had sloughed away, and there was considerable bogginess in the right temporal fossa over the ear. Collections of pus took place at the various places named and, although openings and counter-openings were promptly and freely made, portions of both upper eyelids sloughed; the patient gradually sank and died on the thirty-seventh day of the illness. It is thought that absorption of septic matter took place at the site of an unhealed ulcer in the bowel, as the result of which the pyæmic manifestations developed.

Valentini⁶⁹, *June*, states that in a case of mild but well-defined enteric fever, on the day after the last elevation of temperature, a painful swelling was observed just below the right sterno-clavicular articulation. Fluctuation developed, and a week later an incision was made, evacuating 10 cubic centimetres ($2\frac{2}{3}$ fluidrachms) of thick, creamy pus. No micro-organisms could be found microscopically in the contents of the abscess, but upon cultivation in artificial media organisms corresponding with typhoid bacilli were found. It is inferred that the abscess was secondary to a perichondritis of the first rib caused by the bacilli of enteric fever. The hypothesis is expressed that, as the purulent complications of enteric fever appear only during convalescence, the bacilli have acquired the capability of inducing suppuration in the organism that has been rendered immune by the attack through which it has passed.

Girode³⁰⁰, *Jan., Feb. 6*,² has reported the case of a man, 29 years old, in which, at about the beginning of the third week of an attack of enteric fever, the right side of the scrotum became swollen. Examination showed the right epididymis to be enlarged. There was no urethritis. Five days later death took place from pulmonary complications. At the post-mortem examination, in addition to the intestinal ulceration, the tail of the epididymis was found to be enlarged, in conjunction with the existence of a small hydrocele. The epididymis contained numerous foci of pus in the intertubular connective tissue, while the arterioles were occluded by thrombi. In the pus and in sections, and upon culture in various media, the bacillus of Eberth was found. The opinion is expressed that the epididymis was infected by the bacilli finding their way, in the urine, from the kidney, by way of the seminal vesicles. The urine contained a considerable quantity of albumen, as if there might have been an infectious nephritis.

Fasching, of Gratz, *May*,⁸ reports the results of the examination of the pus obtained in three cases of post-typhoid suppuration. In the first case multiple abscesses formed a few days after deservescence had set in. The pus from one of the abscesses contained many cocci and a few bacilli. By culture, it was possible to isolate two bacilli, one of which corresponded in all particulars with the bacillus of enteric fever; the identity of the other was not determined. In the second case, during convalescence, foci of suppu-

ration appeared deep in the muscles and in the periosteum of the tibia. Two and a half years later, without trauma or other recognized cause, an abscess formed in a corresponding situation. In the third case abscesses formed in the tongue. In all of these cases only staphylococci pyogenes aurei were found. The typhoid bacilli presented certain deviations from the normal, which corresponded with the changes observed in control cultures likewise obtained from pus. Moreover, the cultures developed more slowly on gelatin, produced less acid, and grew more luxuriantly on potatoes.

Cushing, of Dublin, Va.,⁸¹ reported the case of a colored woman, 28 years old, who had nursed her husband in an attack of enteric fever, and subsequently herself presented the symptoms of the disease. In the second or third week the woman complained of pain in the left leg, which felt cold and clammy; the pulse was infrequent, the temperature subnormal. Arterial pulsation could be felt in the groin, but not below the level of the profunda. In spite of the employment of local and constitutional remedies, gangrene of the leg set in, a line of demarkation forming posteriorly, a little above the knee-joint, and anteriorly extending almost to the upper third of the thigh. Sloughing finally took place, and after six or eight weeks the woman died.

Rosin and Hirschel^{69, 112} have reported a case of enteric fever in a man, in which, on the twentieth day after having taken to bed, the temperature having already reached normal, an area of infiltration about an inch in diameter was observed just below one knee. The temperature rose and the whole leg and ankle became œdematosus. A deep incision into the tissues failed to disclose the presence of pus, but the knife passed through dense, indurated tissue. From the superficial muscular layer a quantity of dark-brown necrotic tissue escaped. The edges and base of the wound became infiltrated, but the wound slowly healed. Examination of the necrotic tissue, both microscopically and by culture methods, disclosed the presence of bacilli of enteric fever.

At a meeting of the Chicago Pathological Society, Schaefer⁶¹, reported the case of a colored man, 39 years old, who presented symptoms of enteric fever: headache, epistaxis, pain in the right iliac fossa, gurgling, petechial spots, elevation of temperature, increased frequency of pulse. At the end of six or seven weeks

chills appeared, with tenderness over the liver. Abscess of the liver was diagnosticated and operation proposed, but the latter was rejected. Subsequently ascites developed, for the relief of which paracentesis was performed. Shortly afterward the abscess pointed, and about 1 gallon (4 litres) of pus was evacuated. A few days later the man died. At the post-mortem examination an abscess as large as two fists was found on the upper surface of the right lobe of the liver. The liver was adherent to the parietal peritoneum about three inches below the costal arch, the left lobe being pushed up under the diaphragm. In the discussion that followed the reading of the report the question of diagnosis was raised, and the possibility was suggested of the condition having been one of hepatic abscess from the outset. Bourdillon, of Marseilles,⁴⁶ has reported the case of a man, 32 years old, in which, at the period of decline of an attack of enteric fever of ordinary intensity, the symptoms of atrophic cirrhosis of the liver manifested themselves, with icterus and ascites. The patient had, during the previous two years, from time to time, presented symptoms of gastro-hepatic derangement, but not those of an organic affection of the liver. Bacteriologic examination of the blood, made a month after convalescence from the attack of enteric fever, disclosed the presence of streptococci. The question arises whether the interstitial inflammation of the liver was induced or aggravated by the attack of enteric fever, with its contingent intoxication, or resulted from the presence of the micro-organisms in the blood.

Favier⁴⁷ has reported a case of enteric fever, complicated by the occurrence of splenitis, advancing to suppuration, together with left-sided pleurisy, and terminating fatally; and a second case of enteric fever, complicated by perisplenitis and left-sided pleurisy, in which recovery took place. It is not quite clear at what period in the disease the complications arose, although it seems to have been late. In the first case the most prominent symptom was intense pain in the left hypochondrium, over the spleen; spontaneous, aggravated by pressure, by palpation, and by movement. The area of splenic percussion dullness was somewhat increased. The percussion resonance was slightly impaired at the base of the left lung, and pleural friction could be heard on auscultation. Local bleeding and the administration of sedatives were attended with no relief, but the application of a dozen leeches about the

anus was speedily followed by amelioration. The patient apparently began to improve, but a typhoid condition developed, and death took place. At the post-mortem examination the heart-muscle was found fatty, the lungs congested; there were evidences of a recent pleurisy at the base of the left lung; the small intestine presented numerous ulcerations; the mesenteric glands were enlarged; the spleen was enlarged, friable, and adherent to the diaphragm, and contained a superficial abscess as large as a small apple. The second case was also marked by intense pain in the left hypochondrium and by considerable enlargement of the spleen; it was further complicated by the occurrence of intestinal haemorrhage; left-sided pleurisy, with effusion, developed. The symptoms gradually subsided, but recurred later in the course of the disease. Recovery finally ensued. Kraft³⁶⁵ has made a study of intestinal haemorrhage in the course of enteric fever. He found the complication to occur in 4.24 per cent. of cases. Women seem rather more predisposed to its occurrence than men; 26.2 per cent. of the cases in which intestinal haemorrhage takes place terminate fatally, males dying in larger proportion than females. The haemorrhage is commonly repeated. Of forty-two cases haemorrhage was repeated in twenty-nine. The quantity of blood lost varies from 150 cubic centimetres to 2 litres (5 ounces to 2 quarts), but the prognosis is not directly dependent upon the amount of blood lost. The complication usually occurs toward the end of the second or the beginning of the third week. Among the symptoms are bloody stools, anaemia, reduction of temperature, increased frequency of pulse, collapse, and sometimes delirium. The diagnosis is easy, the prognosis not unfavorable.

Kinkead, of Galway,¹⁶ reported the case of a woman, 52 years old, who came under observation on October 2, 1891, after having had diarrhoea for five weeks. The symptoms of enteric fever were well marked: rose-spots; tympanites; pain, tenderness, and gurgling in the right iliac fossa; elevation of temperature; pea-soup stools. The urine was scanty, of low specific gravity, and contained albumen. On October 8th pneumonia developed at the left base. On October 13th copious haemorrhage from the bowels took place. On October 27th the pneumonia involved both bases. On November 8th a more profuse haemorrhage than the first took place. On December 24th the stools began to be formed, and on the 30th

the temperature began to decline. Without obvious cause, the temperature again rose on January 16th, to decline once more on the 30th. The patient was dismissed from the hospital on February 9th. Subsequently, she presented transient elevations of temperature. On March 11th she had profuse bleeding from the throat, the blood apparently coming from a point behind and below the left tonsil. During the progress of the fever digestion and absorption were much enfeebled. If alcohol was withheld, the heart threatened to fail. Milk disagreeing, bread-jelly was given and relished, as well as digested. Quinine was well borne, but proved inert to reduce the temperature. Turpentine stupes relieved the abdominal distension. Ergot was principally used to check haemorrhage. Almost continuous dry cupping was kept up over the lumbar and thoracic regions.

Elsner, of Syracuse,²⁰⁵ describes the case of a man, 27 years old, who came under observation in the second week of an enteric fever, with characteristic symptoms and hypostatic congestion of the bases of the lungs. Diarrhoea was absent, and there was only the usual degree of tympanites. The treatment consisted essentially in restriction of the diet to liquids, the administration of intestinal antiseptics, and the avoidance of antipyretics. After the lapse of a week a decided change was suddenly observed to have taken place. The face became anxious; the eyes sunken. There was constant hiccough, with vomiting of a dark-green fluid. There was pain of moderate intensity in the upper portion of the hypogastrium, on the right side. The pulse was increased in frequency, while the temperature remained elevated. The abdominal tenderness became increased in intensity and extent, and soon dullness on percussion could be elicited in the right hypogastrium. For eight hours there was anuria, followed by scanty micturition. On the following day tumefaction could be detected in the region in which dullness had already been observed. Localized peritonitis over an ulcer of the bowel, with adhesion, was diagnosticated. A day later the temperature had become subnormal and the extremities cold. The area of hepatic percussion dullness was not effaced. For the next few days there was little change in the condition of the patient, except an apparently slight improvement. He was then suddenly seized with five copious intestinal haemorrhages, and soon died, almost exsanguinated. At the post-mortem

examination the intestines were found distended. There was no general peritonitis. At a few points spots of plastic exudate could be seen. There were, however, present the evidences of a recent and circumscribed plastic peritonitis in the right inguinal region. The source of the fatal haemorrhage could not, however, be determined.

Lafleur²⁸² has reported the case of an inebriate, 25 years old, who died on the fortieth day of an attack of enteric fever, and in which the occurrence of perforation was indicated by a decline of the temperature from 101° to 96° F. (38.3° to 35.5° C.). At the post-mortem examination general purulent peritonitis was found; a pinhole perforation was found at the base of an ulcer five or six inches above the ileo-cæcal valve. At a meeting of the Royal Academy of Medicine of Ireland, O'Carroll² presented specimens from a case of enteric fever, in which perforation of the intestine occurred on the thirty-sixth day, the patient not dying until the fifty-ninth day. The intestines in the hypogastric and pelvic regions were matted together by peritonitis, and a perforation was found in the ileum, communicating with an abscess-cavity full of grumous pus. All of the intestinal ulcers, except that which was the seat of perforation, had healed. At a meeting of the Medico-Chirurgical Society of Montreal, Finley²⁸² exhibited a specimen of a typhoid ulcer, with a small, round, central perforation. A small quantity of fluid had been present in the peritoneal cavity, but there had been no general peritonitis. The spleen was remarkably small, weighing but 95 grammes (3 ounces). The attack had set in suddenly, and ran a mild course until the thirteenth day, when the patient was seized with sudden pain in the abdomen, the temperature falling to 95° F. (35° C.), the pulse becoming weak, and vomiting and abdominal distension making their appearance. The temperature, subsequently, never rose above normal. The patient survived the perforation for nearly four days.

Bayer¹³⁶,_{July 16} has reported the case of a colleague, who presented himself on account of aphonia and dysphagia, examination disclosing the existence of acute laryngo-pharyngitis. The symptoms subsided upon the institution of appropriate treatment, but after the lapse of a few days the man was seized with a severe chill, followed by decided elevation of temperature. He complained considerably of sore throat and discomfort in the naso-pharynx. On ex-

amination, a number of small, superficial ulcers were now found on the soft palate, on the pillars of the fauces, and in the pharynx. A day later rose-spots made their appearance. In particles of tissue removed from the borders of the ulcerated areas the bacillus of enteric fever was found. The catarrhal condition of the pharynx extended to the Eustachian tubes, deafness resulting. The ulceration in the pharynx disappeared toward the end of the third week, but the temperature failed to decline, while intestinal haemorrhage occurred and pneumonia developed, to which the patient finally succumbed. Bayer calls attention to the fact that the respiratory complications of enteric fever generally appear toward the end of the first week as rhinitis, with injection of the mucous membrane of the pharynx and larynx, and the accumulation of viscid, sanguinolent mucus in the naso-pharynx; catarrh of the Eustachian tube and middle ear, giving rise to deafness. Sometimes intense angina is observed. Superficial ulceration of the palate, pharynx, and uvula may occur, which, although of itself not grave, is unfavorable as regards prognosis; it assumes diagnostic significance by reason of the presence of the bacillus of enteric fever.

Rénon¹⁰⁰ _{Aug. 2} reports two cases of enteric fever in which membrane formed upon the tissues in and about the pharynx. The one case occurred in a man 23 years old, the pharyngeal manifestations appearing toward the close of the attack; by direct examination and by culture the presence of streptococci in the membrane was demonstrated. Later, a thrombus formed in the left internal saphenous vein. The patient recovered. In the second case—a man, 29 years old—the pharyngeal complication appeared early; in the membrane staphylococci pyogenes albi were found. Later in the attack an abscess formed at the lower epiphysis of the right tibia, at the site of an old fracture, in the pus from which staphylococci were also found. In both instances the specific bacillus of enteric fever was looked for, but was not found. This patient also recovered. Both patients were treated by means of cold baths. Gerlóczy, of Budapest,¹⁰¹ _{Apr. 14} has reported the case of a girl, 14 years old, who was seized with a chill, followed by fever, malaise, pain in swallowing and vomiting; the bowels were constipated. The tongue was heavily coated and tremulous on protrusion. The mucous membrane of the pharynx was livid and infiltrated; the tonsils and uvula were red and enlarged. The sub-

maxillary glands were slightly enlarged. Diffuse bronchitis existed. The spleen was somewhat enlarged. Respiration and pulse were accelerated. The urine contained a small quantity of albumen. The case was treated as one of diphtheria. Some ten days after the beginning of the illness several rose-spots were found on the abdomen and the spleen had increased in size. A day later membrane appeared in the throat. The two diseases steadily pursued their course. Dyspnoea became more and more marked; swallowing became impossible; pulmonary oedema set in, and the patient succumbed. At the post-mortem examination, in addition to the existence of membranous pharyngitis, laryngitis, and bronchitis, swelling and infiltration of the follicles of the ileum and of the mesenteric glands, enlargement of the spleen and parenchymatous degeneration of the liver and heart were found. A case of enteric fever is reported from the service of ⁶Tooth, _{Apr. 2} at the Metropolitan Hospital, London, occurring in a boy 5 years old, in the course of which dullness on percussion developed at the base of the right lung, with large and small dry and moist râles. On about the eighteenth day of the illness laryngeal cough, with stridor and aphonia, appeared. The symptoms became more aggravated, cyanosis and recession of the chest-walls on inspiration supervening, but no membrane was to be detected in the pharynx. Finally, tracheotomy became necessary, but the relief afforded was only transient. The cervical glands became enlarged; evidences of the presence of membrane in the trachea appeared, and the patient succumbed to collapse on the twenty-fourth day. At the post-mortem examination the larynx and trachea were found lined with diphtheritic membrane. The right lung was completely consolidated with old broncho-pneumonia; the left lung was collapsed and somewhat congested. In the cæcum, close to the ileo-cæcal valve, was a congested Peyer's patch, slightly ulcerated at one point. Several similarly congested, but not ulcerated, Peyer's patches were found in the ileum. The mesenteric glands were enlarged, particularly those in relation with the cæcum. The spleen was enlarged to twice its natural size.

Robinson, of New York, ⁵⁰ Sept. calls attention to the aural complications of enteric fever. Early in the attack, buzzing, whistling, ringing, and humming may be present. As a rule, these sensations soon diminish or disappear; occasionally, they become more intense

and of pathologic significance. With them may be associated pain in the ears. Notable pain is almost invariably indicative of acute local inflammation, either of the external auditory canal or, more probably, of the middle ear. At times impacted cerumen is the sole apparent cause of distress, and upon its removal the unpleasant symptoms subside. On other occasions the tympanic membrane is acutely inflamed. By judicious treatment this condition may be made to disappear in the course of a few days, without suppuration or perforation. Occasionally, perforation of the tympanic membrane will occur without the previous manifestation of pain. While aural pain and inflammation and perforation may occur early in the course of an attack of enteric fever, these complications are more common in the second and third weeks. Some degree of deafness is usual in enteric fever; one or both ears may be affected. The condition may be due to the extension of a catarrhal process from the pharynx to the middle ear by way of the Eustachian tubes; to the blunted sense perceptions incident to the poison of the disease; to periostitis of the middle ear, or to labyrinthine otitis. Otorrhœa in the course of enteric fever is more common in children than in adults, and is a frequent antecedent condition in connection with the cerebral complications occasionally encountered. Suppuration of the internal ear may be followed by meningitis. Caries of the petrous portion of the temporal bone is an occasional cause of purulent meningitis. Cerebral abscess is also a not infrequent sequel. Sinus thrombosis, suppuration of the mastoid cells, erysipelas, and general pyæmia are among the late and disastrous complications that may be encountered in connection with caries of the petrous portion of the temporal bone. Cases are on record in which acute suppuration of the middle ear has been attended with septic meningitis and death, and no involvement of the temporal bone has been found. In some cases the cerebral complications may arise through the medium of the general circulation. Independently of these complicating conditions, the middle ear may undergo suppuration during convalescence from enteric fever, and hearing be lost in consequence.

Eisendradth, of Chicago,⁹ has reported four cases of enteric fever in which facial erysipelas occurred as an intercurrent affection, all terminating fatally. The first case was in a man 26 years old, and was characterized by nervous symptoms and

asthenia. Erysipelas developed in about the third week. Death took place a few days later. Only the usual lesions were found at the post-mortem examination. The second case occurred three days after the first, in a male 28 years old, the patients occupying beds in the same ward, though some thirty feet apart. The first case was isolated, but both were attended by the same physician. In the second case albumen and tube-casts appeared in the urine, intestinal haemorrhage occurred, and a round-worm was vomited. Erysipelas developed on the twenty-seventh day of the illness. Death took place eleven days later. The third and fourth cases occurred five months after the first and second; the patients occupied beds in different wards, but were under the care of the same physician. In the third case the patient was a woman 27 years old. Erysipelas appeared on the twenty-first day of the illness, and death took place three days later. The fourth case was separated from the preceding by an interval of eight days. The patient was a male 38 years old. Erysipelas appeared upon what was estimated to be the twenty-second day of the illness, and death took place thirty-six hours later. In the first, second, and fourth cases, it is thought that an abrasion of the nose, as a result of picking, provided the channel of infection.

Donald⁶ has reported two cases of enteric fever in sisters, 4 and 8 years old, respectively, situated amid unfavorable hygienic conditions, one child having been taken ill a day or two after the other. The symptoms were much alike in the two cases, nervous manifestations predominating. Toward the close of the second week a typhoid condition developed, and a few days later a hard swelling appeared in the right cheek of the younger child, which gradually increased in size and became tense and glazed externally. Ulceration took place internally, but the child became comatose and died before perforation had taken place externally. Induration of the right cheek appeared in the elder child two days later than in the younger, and pursued a similar course to a fatal termination.

Littlejohn² has reported two fatal cases of noma following enteric fever, in children being treated in the same ward, at the same time, and attended by the same nurse. In one case both cheeks were involved; in the other, in addition to the involvement of one cheek, the skin below the right trochanter became gangrenous before death.

Gerlóczy, of Budapest,⁶⁹ _{Apr. 14} has recorded the case of a girl, 9 years old, who for three days complained of intense headache. Then a chill occurred and fever set in. In the course of a few days the malaise became so marked that the child was compelled to take to bed. During this time the bowels moved loosely three or four times a day. The pupils were large and reacted sluggishly. Restlessness was a marked feature. The abdomen was slightly tumid. The pulse was exceedingly rapid. The temperature was now 36.5° C. (97.7° F.). The urine was passed involuntarily. The patient was delirious, and cried constantly and most vociferously. There was marked hyperaesthesia. The case was treated as one of meningitis. Most of the time the temperature remained below the normal; occasionally it rose slightly above. The cerebral symptoms gradually subsided. Hitherto it had been impossible to make a physical examination. It was now found that the spleen was enlarged. The bowels had been loose throughout. Three weeks after the onset of the symptoms rose-spots were detected upon the abdomen. At the same time four small abscesses were found upon the scalp. Although the child continued to improve, other furuncles appeared upon the face and abdomen and in the gluteal regions. Later still, a fine, measly eruption appeared upon the chest, abdomen, and back, along the spinal column, on the arms, and on the extensor surfaces of the legs. The eruption disappeared in the course of a few days, fine desquamation following. In spite of the many complications, convalescence ultimately set in, and the patient eventually made a satisfactory recovery.

At a meeting of the Glasgow Pathological and Clinical Society, Mackintosh²¹³ _{July} presented a man, 19 years old, who had had an enteric fever six years previously, being confined to bed for twelve weeks. In the tenth week of the illness his feet began to swell. Six weeks later he was attacked with scarlatina. The legs remained swollen. Shortly afterward the subcutaneous veins of the trunk and extremities were noticed to be prominent. The swelling of the legs gradually disappeared, but the condition of the veins persisted. The veins more especially involved were the internal mammary, superficial epigastric, external pudic, internal saphenous, and superficial circumflex on both sides, through which a collateral venous circulation was carried on. The inference is

that a thrombus formed at the junction of the iliac veins and the inferior vena cava, became organized, and thus constituted a permanent obstruction to the venous blood-current from the lower extremities.

Reynolds, of Wolverhampton, ^{Sept. 24} reported the case of a boy, 14 years old, in which, on the sixteenth day of apparent convalescence from an attack of enteric fever, the temperature again rose and the diarrhoea returned with its previous severity. This attack pursued a shorter course than the primary attack, but a few days after its subsidence symptoms again appeared. A week later a large round-worm, ten or eleven inches long, was passed by the bowel. Recovery was thereafter uninterrupted. The primary attack is believed to have been one of enteric fever. It is a question whether the second was a relapse or was dependent upon the presence of the intestinal parasite. Moore, of Dublin, ^{16 Apr.} treated a man who had a typical attack of enteric fever at the age of 15 years, lasting twenty-three days, characterized by constipation and unattended with complications. At the age of 29 years he had a second attack, lasting twenty-four days. After a subfebrile period of a week convalescence apparently set in. Eleven or twelve days later, however, acute febrile symptoms again appeared, and the patient passed through a well-defined relapse, which lasted twenty-two days, permanent recovery ultimately taking place. Jos. Leidy, Jr., of Philadelphia, ^{451 Aug.} has reported the case of a man who had had an attack of enteric fever in his sixteenth year and a second attack some six months later. A third attack occurred at the age of 34, and this in turn was followed by four relapses, in the third of which intestinal hæmorrhage occurred. Ultimate recovery ensued.

Diet.—Beatty, of Dublin, ^{16 May} has made a contribution to the subject of the dietetic management of cases of enteric fever. He agrees that milk is the best and safest food; given diluted with carbonated water, lime-water, or simple water, it agrees well with most patients. If diarrhoea exist, the milk is best boiled. Sometimes it becomes necessary to peptonize it. If milk is vomited or curds are passed by the bowel, whey may advantageously be substituted; at the same time beef-tea with the grounds, or beef-juice, should be given. Farinaceous foods and eggs are objected to. From 2 to 3 pints (1 to 1½ litres) of liquid nourishment in the twenty-four hours are considered sufficient for an adult. In case of

diarrhoea, an excess of liquid food is to be avoided. Constipation is not to be permitted to continue for more than two days, unless there have been preceding intestinal haemorrhage. Haemorrhage is to be guarded against, tympanites kept under control, and sleeplessness and delirium prevented by restriction of the diet. A favorable influence is also exercised upon the temperature by care in diet. Unlimited indulgence in simple drinks is not sanctioned. Water should be given in moderate quantities, or pieces of ice and a little lemonade may be allowed. Tea, morning and evening, is also grateful and safe. With the setting in of convalescence the consistence of the food is to be gradually increased. For a few days it is safer to increase the quantity of food than to make any change in its character. First, the milk may be thickened with corn-flour or arrow-root; then, after a few days, a lightly-boiled egg and a few plain biscuits may be given; then bread; then fish; and so on. A rise of temperature would indicate that the food was being increased too rapidly or injudiciously.

Püritz⁸⁰ _{no. 46, vi; Mar.}²⁶ gives the results of comparative observations made in a number of cases of enteric fever, some of which were kept upon the usual restricted diet, while others were placed upon a generous diet, given in small quantities at short intervals. It was found that in both groups of cases the patients steadily lost weight throughout the whole febrile period, until the occurrence of defervescence. In the patients who were well fed, however, the daily losses were less, while the amount of nitrogenous assimilation was greater than in the others. In the well-fed patients the daily loss of nitrogen (by the urine) was, on an average, 25 per cent. less than in the underfed patients. The generous feeding appeared to exert a beneficial influence upon the course and symptoms of the disease.

Treatment.—A good summary of the current treatment of enteric fever is given in an editorial.⁹ _{Sept. 10} The first place is given to the method of cold bathing of Brand, systematically carried out. The employment of antipyretic drugs, and especially those of the coal-tar series, is unqualifiedly condemned. In cases in which the full cold bath is contra-indicated, or for any other reason cannot be employed, frequent cold sponging, ice-rubbing, the cold wet-pack, cold spraying; the binding of cold cloths upon the wrists; the application of ice-bags to the head, chest, and abdomen; enemata

of ice-water, and various other methods of utilizing cold may be employed as more or less efficient substitutes. These cannot, however, fully replace the bath. Under such circumstances, an attempt should be made to secure intestinal antisepsis by the judicious use of drugs, such as calomel, beta-naphthol, naphthalin, salol, creasote, guaiacol benzoate, guaiacol salicylate, bismuth salicylate, zinc sulpho-carbolate, and the like. When the indications for turpentine (dry, glazed, or brown tongue, with tympanites) are present, it or terpin hydrate may be used. Strychnine is sometimes useful, especially toward the close of the third week, when the heart is becoming enfeebled. Alcohol also finds a place at about this time. Water must be given freely to drink throughout.

Barr, of Liverpool,²⁰⁷² has reported the treatment of fifty-five successive cases of enteric fever, with one death. Twenty-five patients were treated by continuous immersion in water. For this purpose a tank—6 feet long, nearly 3 feet wide, and 16 inches deep, lined with lead, and having a capacity of 70 gallons—was employed. The patient, wrapped in a blanket, rests upon bed-ticking, the head, of course, not being immersed. Special provision is made for carrying off the dejections and for renewing the water, as well as changing its temperature, as circumstances require. A thermometer is constantly kept in the tank. As long as the temperature of the patient is over 100° F. (37.77° C.) that of the tank need not be higher than 93° F. (33.88° C.); but, as the body-temperature approaches the normal, so should the tank-temperature. Eleven cases received some special form of treatment, such as the wet-pack, etc. Twenty-two received symptomatic treatment. If retching and vomiting were present, and the patient came under observation early, an emetic was administered, preferably 2 or 3 tumblerfuls of hot water. Treatment was usually begun with a good calomel purge, about 2 grains (0.13 gramme) being given. If the attack were attended with constipation, calomel was also given throughout the disease, in doses of $\frac{1}{2}$ -grain (0.032 gramme), repeated according to indications. In cases of protracted constipation, in which intestinal ulceration is feared, an ice-bag, cold compresses to the abdomen, immersion in the tank, intestinal antisepsics with small doses of calomel, or turpentine either by the mouth or by enema, are indicated. The routine administration of intestinal antisepsics is strongly advocated. Salol

is preferred. Ten grains (0.65 gramme) may be given to an adult every four hours; if there be much diarrhoea, 10 grains of bismuth salicylate may be added to each dose; if the bowels are confined, $\frac{1}{2}$ grain (0.0054 gramme) of calomel may be given with each dose.

Wilkins ²⁸² _{Jan. 9, May 29} expresses himself heartily in favor of cold baths. Juhel-Rénoy ³ _{June 22} has reported the results of a collective investigation as to the mortality from enteric fever in the hands of those who employed divers modes of treatment. Of 60 physicians of whom he made inquiry, 40 replied. Of these 40, 14 expressed themselves as opposed to systematic bathing; 12 were strong advocates of the method, employing it in all cases, grave or mild; 8 were advocates of the method, but with certain restrictions; the remaining 4, while in favor of the method, had little opportunity for its application. Those of the first group had together treated 175 cases of enteric fever, with 25 deaths—14.2 per cent.; those of the second had treated 39 cases, with 1 death—2.56 per cent.; those of the third had treated 554 cases, with 54 deaths—9.74 per cent.; those of the fourth had treated 492 cases, with 40 deaths—8.13 per cent. For comparative purposes, the number of cases treated in the second group is too small to be of any value.

Rabinovitch ¹ _{Mar. 19} makes a strong plea for cold baths. She reports a case of enteric fever in a young girl, where acetanilid was employed to reduce the temperature; the case terminated fatally. Nine other cases, 3 of which were complicated with pneumonia and 1 with pleurisy with effusion, were treated by means of cold water, and all recovered. Ellett, of Philadelphia, ⁹ _{Dec. 12, 91} treated 39 cases by cold water applied externally, most commonly in the form of the bath, with 2 deaths. The Brand method was not accurately followed. O'Reilly ⁷⁰⁰ _{Sept. 24} reports that 34 cases were treated at St. Mary's Hospital, of Saginaw, Mich., during the year 1892. For the first nine months the treatment consisted in cold sponging and the administration of salol; 4 deaths occurred. In the last three months the administration of salol was continued, but cold baths were substituted for the sponging. More cases were treated during the last three months of the year than during the first nine months, but there were no deaths in the second period. Gogrewe, of Greifswald, ⁶⁹ _{Feb. 6} has reported 63 cases of enteric fever, with but 2

deaths. In treatment the greatest stress was laid upon change of posture and the employment of the graduated bath, the temperature of the water being reduced from 26° to 21° C. (78.8° to 69.8° F.). Other agents were used as indicated. Special care was taken to avoid constipation, for which salicyl-borated enemata were employed. Careful attention was also paid to the disinfection of the dejecta and of the linen of the patients.

Schmid, of Luzerne,²¹⁴ *Sept.* has reported a series of 30 cases of enteric fever, 10 of which were so mild as to require no systematic treatment, and the remaining 20 of which were treated with thallin. Of the latter, 15 were in males and 5 in females. The patients varied in age from 16 to 45 years. The diagnosis was unequivocal in all of these cases. The diet consisted principally of milk, together with a little meat-broth, egg, and alcohol; the last in quantity in accordance with intensity of the attack and the individuality of the patient. In most cases an initial dose of calomel was given. In many cases the administration of thallin was begun on the day of admission to hospital; in other cases on from the second to the fifth day, partly because the diagnosis was not positive and partly to determine the type of temperature. It was found most convenient to give the drug in a 1-per-cent. or 2-per-cent. solution. During the day, from 6 A.M. to 9 P.M., it was administered every hour; during the night, in some cases every three hours, in other cases every two hours. At first, from 0.08 to 0.15 gramme ($1\frac{1}{4}$ to $2\frac{1}{3}$ grains) of thallin was given. The temperature was taken each time before the medicine was given. The dose was gradually increased, until it proved sufficient to keep the temperature at the normal level, or a little lower. If the temperature became lower, the remedy was temporarily withheld. The smallest maximum dose was 0.12 gramme ($1\frac{1}{5}$ grains); the largest, 0.4 gramme (6 grains). The largest amounts given in 24 hours were 7.54, 7.6, and 7.88 grammes (116, 117, and 162 grains), respectively; the largest total amounts given were 137.31 grammes ($4\frac{3}{8}$ ounces) in 23 days, and 177.99 grammes ($5\frac{3}{4}$ ounces) in 27 days, respectively. The shortest periods for which the drug was used were 5 and 7 days, respectively; the longest, 18, 21, 23, and 29, respectively. Of the 20 cases treated with thallin, 2 died: one from perforation; the other, a right hemiplegic, in an attack of dyspnoea, of which he had previously had repeated

attacks. The most conspicuous effect of the medication was observed on the course of the temperature. In most cases this could be kept practically at the normal level. The belief is expressed that the result is dependent upon an antifebrile action. No evil effects upon the heart were observed; collapse did not appear, and the frequency of the pulse was in harmony with the febrile condition. No unpleasant symptoms referable to the kidneys were observed. The remedy was almost universally well borne. In no case did it appear to occasion diarrhœa. In almost all the cases sweating (with the decline) and chilliness (with the ascent of the temperature) constituted unpleasant features. As a rule, the sensorium became clear and the general condition remained good. Five relapses occurred. There were no complications, except that of perforation in one of the fatal cases.

Musser, of Philadelphia,²⁰⁷³ calls attention to the danger of administering antipyretics under certain conditions in the course of enteric fever: in the early or middle period of the disease in cases in which patients are brought from a distance; in certain cases in which the patients manifest an idiosyncrasy to antipyretics; in the later stages; and in cases in which, although the morbid process has come to an end, the temperature continues high or actually rises. Lewers²⁶⁷ _{Oct. '91} found that, in 19 cases in which no antipyretic drug was given, the average residence in the hospital was $57\frac{1}{4}$ days, while in 15 cases in which such drugs were employed the average was 73.6 days. In the first group of cases there were 2 relapses; in the second, 9; 2 cases relapsing twice.

Eliot, of New Haven,¹ _{Aug. 6} designates as specific the treatment of enteric fever by means of carbolic acid and tincture of iodine in conjunction with calomel. He directs that the patient take 10 grains (0.65 gramme) of calomel on alternate days until four doses have been taken. Of a mixture containing 1 drachm (3.89 grammes) of carbolic acid and sufficient tincture of iodine to make 4 drachms (15 grammes), 4 drops are given in a wineglassful of cold water every four hours. Proportionately smaller doses are given to children. To attain success, the treatment must be instituted early and continued late. If the bowels are not moved within twelve hours after the ingestion of a 10-grain (0.65 gramme) dose of calomel, it is recommended that 1-drachm (3.89 grammes) doses of magnesium sulphate be given every four hours until a movement occurs.

Should symptoms of mercurialism appear, a mouth-wash of potassium chlorate, 1 drachm to 4 ounces (3.89 to 120 grammes) of water, should be employed. Based upon personal experience, Stinson, of Montague, Texas, ^{Jan. 30} recommends the following combination:—

R Quininæ sulphatis,

Potassii chloratis, $\text{m}\ddot{\text{a}}$ gr. x (0.65 gramme).

Acidi carbolici puri, $\text{M}\ddot{\text{x}}$ (0.65 gramme).

M. fiat capsule no. x.

Sig. : One every four hours, with two, three, or four drops of oil of turpentine.

If the fever is active, tincture of veratrum viride is given, in doses of one, two, or three drops.

Pearson, of Stockenstrom, Cape Colony, ^{Dec. 5, '91} employed, with most gratifying results, a solution of chlorinated soda in the treatment of a large number of cases of enteric fever. The solution is prepared by dissolving 1½ pounds (745 grammes) of sodium carbonate in 24 ounces (720 grammes) of water; triturating well a pound (497 grammes) of calcium chloride in 120 ounces (3600 grammes) of water, filtering; then mixing the two solutions, and again filtering. The solution should be perfectly clear and free from any trace of lime. It should be kept in a cool and dark place. Of this solution, 15 minims (0.97 gramme) are given to an adult every three hours. The bowels are not interfered with unless there be constipation for forty-eight hours, when a mild dose of castor-oil is given. The treatment is continued until the temperature has been normal for two successive evenings. Anderson, of Barrow-in-Furness, ^{Dec. 12, '91} successfully employed a solution of ferric chloride in a large number of cases of enteric fever, without a death when the treatment was instituted before unavoidably fatal conditions had arisen. To an adult he administers 5 drops of the liquor ferri perchloridi fortior, B. P., every hour of the day or night until a week after the complete subsidence of the fever. The dose can be agreeably given in ½ drachm (2 grammes) of glycerin or 1 drachm (4 grammes) of simple syrup and a few drops of tincture of strong ginger, diluted with ½ tumblerful of water. If nausea is produced, 5 grains (0.32 gramme) of bismuth subnitrate are given ten minutes before each dose. Werner ²¹, _{Jan. 11} reported the employment of chloroform in one hundred and twenty-six cases of enteric fever, with but four deaths. The drug was used in a 1-per-

cent. solution, of which 1 or 2 tablespoonfuls were administered every hour or two, by night as well as by day, at the height of the attack; in the decline of the attack a tablespoonful was given every two or three hours. In general the symptoms were favorably influenced and complications and sequelæ were uncommon.

Klietsch, of Wörth-am-Main, ^{July 26}³⁴ has reported an epidemic of enteric fever engendered by the contamination of the water-supply by an old and unused privy-well, 121 persons—53 males and 68 females—being affected. A large variety of therapeutic measures were employed, including cold baths, cold applications, acetanilid, antifebrin, quinine, thallin, phenacetin, resorcin, salicin, potassium chlorate, creasote, calomel, and iodine. The last was employed in the form of potassium iodide, iodoform, and the pure metal, and appeared to act as a specific. Eighty-one cases were thus treated, with but two deaths: one from perforation after an error in diet during convalescence, the other from meningitis. The following formula was largely employed:—

R. Iodi, gr. viiss-xiiss (0.5 – 0.8 grammes).
Potassii iodidi, . . . 3iiss-ij (6.0 – 8.0 grammes).
Aq. menth. pip.,
Aq. destil., ää 3iiss (10.0 grammes).
M. Sig.: From 8 to 10 drops every two hours.

Fussell, of Philadelphia, ¹¹²_{p. 496, 91} lauds the utility of salol in the treatment of enteric fever. He admits that it is not a specific, but thinks that it materially shortens the course of the disease, controls the diarrhoea, changes the character and overcomes the fætor of the stools, and relieves the dryness of the mucous membranes. The drug was given in 5-grain (0.32 gramme) doses every three hours. Of thirty-eight cases thus treated, four terminated fatally, one, however, as a result of neglected intestinal haemorrhage. No unpleasant effects could be observed. Farrar, of Camden, N. J., ⁹_{Jan. 16} commends the employment of bismuth sub-iodide and salol. This therapeusis has seemed to him to diminish tympanites, control diarrhoea, and prevent haemorrhage. The two drugs were administered alternately. Twenty-six cases were thus successfully treated.

Hervouët ¹²⁷_{Feb. 15} reported the conjoined employment of laxatives and intestinal antiseptics in the treatment of sixty-three cases of enteric fever, with but two deaths. A vigorous purgative was

given at the outset. Thereafter, until the termination, from 2 to 4 drachms (8 to 15 grammes) of magnesium sulphate were given daily, together with from 30 to 45 grains (2 to 3 grammes) of naphthol. Bouillon, milk, and water were permitted in abundance.

Nealey, of Bangor, Me.,¹¹² from his own experience, recommends, for the relief of the tympanites that sometimes appears in the course of enteric fever, and occasionally contributes to a fatal termination, the employment of an enema containing 1 ounce (30 grammes) of salts, 2 ounces (60 grammes) of glycerin, 3 ounces (90 grammes) of warm water, and 30 drops of turpentine. Langdon, of Cincinnati,¹¹³ used mercuric chloride, in doses of from $\frac{1}{2}\frac{1}{4}$ to $\frac{1}{2}$ grain (0.0025 to 0.005 gramme), administered three or four times a day, in tablet or in glycerin and water, in fifty cases, without a death. As a matter of course, the usual restrictions in diet were observed.

Simone¹¹⁴ expresses the opinion that the elevation of temperature that occurs during the first ten days of enteric fever is dependent upon the infection of the bacillus of the disease, while the subsequent fever is mainly due to the presence of other bacteria in the alimentary canal. In conformity with this view, he administers $\frac{1}{2}$ grain (0.05 gramme) of calomel and $\frac{1}{6}$ grain (0.01 gramme) of opium every two to four hours. The good effects of the medication are seen especially after the first ten days of the disease.

Stewart, of Philadelphia,¹¹⁵ points out that the inutility of ergot in the intestinal haemorrhage occurring during the course of enteric fever is dependent upon the fact that the bleeding takes place from an eroded artery, and that, by causing constriction of the arterioles, ergot only tends to increase the loss of blood by increasing the resistance *à fronte*. Another objection to the employment of ergot under these circumstances is that by exciting peristalsis it is likely to favor the detachment of sloughs, with consecutive haemorrhage.

ENTERIC, OR TYPHOID, FEVER.

(From the ANNUAL for 1894.)

Incidence.—Mouser, of San Francisco,¹⁴⁷ reports an epidemic of enteric fever in which the first cases occurred in two men connected with a dairy. Some quarrymen working in the vicinity of the dairy and not using the milk, but drinking the water that was used for washing the cans, were also attacked and one of them died. After the lapse of a month a number of other cases appeared and it was learned that all had been using milk from the infected dairy. The epidemic spread with great rapidity, 362 cases being reported in the course of a month. Of this number 228 were certainly known to have been patrons of the suspected dairy. The water-supply of the dairy was received from a small stream coming from the hills and flowing through cow-pastures. On a little hill, within a few feet of the creek, was a small house, in which it is said there had been a case of enteric fever. The dejections had been thrown out upon the ground in close proximity to a small dam in the creek, from which a pipe supplied a large tank, situated perhaps seventy-five feet below. From this tank all the water used for the purposes of the dairy was drawn. In the immediate vicinity of the tank was a well, from which the supply of water was obtained when the water in the creek fell. Organisms corresponding with the typhoid bacilli of Eberth were found in the water above the dam, of the pond below the dam, and of the tank. Goyon, Bouchereau, and Fourmal⁴⁴³ report a limited epidemic of enteric fever due to the use of infected milk. The first cases were observed in a dairyman and his wife. Subsequently the disease assumed an epidemic character, only attacking those, however, who used the milk from the dairy of the farmer who was first ill. The discharges from the dairyman and his wife were, undisinfected, thrown upon a manure-heap close to a well the water from which was used for rinsing the vessels in which the milk was received. The soil was porous, and there can be no doubt that the water was thus infected, and in turn infected the milk. It was not possible, however, to demonstrate the presence of typhoid bacilli in the water.

Pfuhl, of Berlin,⁵⁸ gives the results of an epidemiological
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study of an outbreak of enteric fever in Landsberg, in the first cases of which the infection was obviously transmitted by the air, and in the later cases through the drinking-water. The source of water-supply was at once cut off and the epidemic soon came to an end. Examination of the water made at a later date disclosed the presence of colon bacilli, but not typhoid bacilli. This indicated that the water had been contaminated by dejecta. The water also contained an excess of sulphites, of chlorine, and of oxidizable matters. Osler, of Baltimore,³⁹ has reported a remarkable house-epidemic of enteric fever lasting for four months, and in the course of which ten persons in one household were attacked and four died. Priestley, of Leicester,⁴⁰ states that a child, with enteric fever, occupied a room in which herb-beer was being brewed. Subsequently 19 additional cases developed in the borough. On careful investigation it was learned that in 15 of these cases the herb-beer had been drunk, but in the remaining 5 the information was not so definite. All other possible sources of infection were practically excluded.

West, of Fort Worth, Texas,¹⁴³ observed a case of enteric fever in an infant 10½ months old, and a second case in a woman 101 years old. In both cases recovery ensued. The first lasted twenty-one days; the second twenty-five days.

Bacteriology.—Of 241 cultures made by Loison, Simonin, and Arnaud,⁹² of blood obtained from the finger in 66 cases of enteric fever, 101 were successful. Staphylococci alone were found in 45 cases; typhoid bacilli in 1; typhoid bacilli, associated with staphylococci, in 3; bacilli coli communes, associated with staphylococci, in 1. Of 41 cases in which the urine was examined albumen was found present in 2. Of 74 cultures made from the urine (from 34 cases), 54 yielded positive results. Staphylococci were found in 20 cases; typhoid bacilli in 2; typhoid bacilli and staphylococci in 6; staphylococci and streptococci in 3; staphylococci and bacilli coli communes in 1; typhoid bacilli, streptococci, and staphylococci in 2. In 3 cases complicated by abscess of the cheek, bilateral suppurative parotiditis and a gangrenous carbuncle of the back, respectively, staphylococci were found; in a fourth case, complicated by suppurating parotiditis, typhoid bacilli were found, in association with staphylococci. Of 3 cases that presented whitish deposits about the tonsils or the anterior pillars of the fauces, culture dis-

closed the presence of staphylococci only in 1; of a mixture of staphylococci and streptococci in the second; and of bacilli coli communes in the third. In three cases in which previously there had been no urethritis, a copious discharge of whitish pus from the urethra set in between the twentieth and the thirtieth day, lasting only for a few days and subsiding without any special treatment. In one of these cases the urine at this time contained typhoid bacilli, while the discharge contained both typhoid bacilli and staphylococci. In the other two cases the urine contained typhoid bacilli and staphylococci, while in one of these the discharge contained typhoid bacilli and staphylococci, and in the other staphylococci and streptococci. A urethral discharge was observed in one other case in which there had previously been an imperfectly cured urethritis. In 10 fatal cases examinations were also made of blood obtained from the spleen, the liver, and the heart in 9, with positive results. Typhoid bacilli were found in 8 cases; twice alone, twice associated with staphylococci, once with streptococci, once with both staphylococci and streptococci, once with both bacilli coli communes and staphylococci, and once with both bacilli coli communes and streptococci. In the ninth case bacilli coli communes were found in association with staphylococci. Analysis showed that in examinations made early in the attack typhoid bacilli were most commonly found, while in later examinations streptococci preponderated, and the conclusion is reached that the pyrexia observed during the first ten or fifteen days is due to the activity of typhoid bacilli, while that observed subsequently is dependent upon the activity of staphylococci.

Vincent²⁶² has found that secondary infection by streptococci is comparatively frequent in cases of enteric fever complicated by secondary suppurations, such as localized periostitis; and he insists upon the exceptional gravity of these complications, from the danger of the streptococci becoming disseminated throughout the body. Complications dependent upon the presence of staphylococci appear to be much less dangerous. Of 41 cases of enteric fever presenting abscesses or other forms of suppuration, the secondary lesions in 32 were due to the presence of either the staphylococcus pyogenes aureus or to mixed infection by the staphylococcus aureus and staphylococcus albus. In all of these cases recovery ensued. In 8 cases streptococci, either alone or in

association with the typhoid bacillus of Eberth, were isolated from the purulent focus. Death occurred in 5 of these. Experiments upon animals confirm the opinion as to the peculiar gravity of the association of streptococci and typhoid bacilli. While active phagocytosis took place after the injection of typhoid bacilli alone, no such phagocytosis could be observed after injection of typhoid bacilli and streptococci. Clinically, the detection of streptococci in the secondary lesions of a case of enteric fever should be regarded as a sign of grave import and an indication for immediate and energetic interference. In order to diminish the risk of these secondary infections, rigorous attention should be bestowed upon the hygiene of the skin.

Du Cazal, of Val de Grace,¹⁴ saw a patient who presented the classic symptoms of enteric fever, including a profuse eruption of rose-spots. Death took place as a result of bilateral pneumonia, which made its appearance on the fifteenth day of the primary affection. Upon post-mortem examination no lesion of the intestinal tract could be discovered, but the enlarged spleen contained virulent typhoid bacilli in large numbers.

Malvoz, of Liége,⁸⁴⁸ in an elaborate study, points out the difficulties in the way of definitely accepting the differentiation of the bacillus of Gaffky and Eberth (typhoid bacillus) and that of Escherich (bacillus coli communis), as well as of accepting the specificity of either organism. He takes the ground that the apparent differences—morphological and biological—between the organisms may depend upon extrinsic influences, and that they may be artificially removed.

Symptomatology.—Ouskow¹¹⁰¹ has made a study of 439 fatal cases of enteric fever among a total of 6513 cases seen at St. Petersburg in the quinquennial period from 1886-87 to 1890-91. The cases were divided, according to season, as follows: There were 1713 during summer, 1356 during autumn, 1704 during winter, and 1740 during spring, the mortality being, respectively, 5.1 per cent., 4.5 per cent., 6.6 per cent., and 7.1 per cent. The largest number of deaths occurred in spring. Thus, of 100 deaths, 30.8 occurred in spring and 15.5 in autumn. Throughout the various seasons of the year a parallelism existed between the general mortality and the mortality from enteric fever. Of 39 fatal cases of enteric fever with relapse, 12 occurred in autumn.

and 10 in spring. Twelve deaths occurred from perforation of the bowel in autumn and 5 during spring. Complications were observed in 18 fatal cases that occurred during autumn and in 39 that occurred in spring. The conclusion is reached that the increased mortality of spring depends upon the character of the disease and upon the attendant complications. The character of the disease depends upon the virulence of the infection and the resistance of the individual. In the majority of fatal cases the mucous membrane of the pharynx was deeply reddened, in places denuded of its epithelium, and at times covered with a dirty-grayish membrane more or less readily detached. The tonsils were swollen, and presented an appearance suggestive of a diphtheric process in 22 cases,—5 per cent. In 4 cases there was deep ulceration, and in 2 a phlegmonous process. Ordinarily the ulcers were not limited to the pharynx, but extended into the fossa pyriformis laryngis. The stomach ordinarily presented evidences of a more or less pronounced catarrhal condition. Characteristic lesions were found throughout the intestinal canal. In 39 cases the follicular apparatus of the large intestine was greatly swollen; in 29 cases ulceration was found, in 1 case not only throughout the entire intestinal canal, but also in the ductus choledochus. In 2 cases of perforation of the bowel an ascaris lumbricis was found in the peritoneal cavity. There were 2 cases of acute peritonitis in which perforation could not be discovered. In 2 the only cause that could be found for an acute peritonitis was necrosis and rupture of a mesenteric gland. Four cases were observed in which the softened spleen had ruptured into the peritoneal cavity without causing peritonitis. Three kinds of colorless blood-corpuscles are distinguished: old elements, of which there are normally 75 per cent.; new elements, of which there are 18 per cent.; and mature elements (with one large nucleus), of which there are 7 per cent. In cases of enteric fever these proportions are changed, so that there are, respectively, 50 per cent., 30 per cent., and 20 per cent. The total number of colorless corpuscles is diminished. In about 30 per cent. of the cases ulceration of the larynx was found; none in the first week. Of cases dead in the second week, 79—15 per cent.—presented ulceration of the larynx; of those dead during the third week, 144—37 per cent.—presented laryngeal ulceration; of those dead in the fourth

week, 89—39 per cent.—presented ulceration. In 1 case there was extensive ulceration of the trachea. In about 8 per cent. of the cases lobar pneumonia existed. Hæmorrhagic pleurisy was observed in 9 instances; 2 of these were cases of general hæmorrhage. There were 11 cases of purulent pleurisy; 1 was secondary to gangrenous bronchitis, 5 to suppuration of the connective tissue of the posterior mediastinum, and 1 was a case of pyæmia. Two cases were attended with partial necrosis of the lung and pneumothorax. Fatty degeneration of the heart was found in 42 cases. Endocarditis existed in 3. In 3 cases polypi were found in the heart; in 12 pulmonary infarcts were found. In 1 case a thrombus occluded the left iliac artery, in another the right jugular vein was similarly obstructed, and in 1 an infarct was found in a small artery of the right kidney. All these cases had reached the fourth or fifth week. In 1 case the entire scrotum became gangrenous; in another, the labia majora; in still another, the sole of the foot, as well as the gum of the right side of the lower jaw. Fourteen cases presented abundant intestinal hæmorrhage, 4 being cases of general hæmorrhage. In 13 cases fatty degeneration of the kidneys was observed. In a number of cases nodular aggregations of bacilli of enteric fever were found in the kidneys. One case presented basilar meningitis, 1 softening of almost the entire left frontal lobe of the brain, and 1 diffuse capillary hæmorrhage. Hæmorrhage into the spinal cord was observed in a considerable number of cases, and was especially noted in the second week, principally in the anterior horns, and rarely in the columns of white matter. The mucous membrane of the uterus was usually thickened, friable, and injected, and sometimes the seat of hæmorrhage. In only 1 case was abortion observed. The complications were as follow: Croupous pneumonia, 44; parotiditis, 17; phlegmons (of various organs), 13; relapsing fever, 1; erysipelas, 16; diphtheria, 2; pyæmia, 7; otitis, 6; gangrenous bronchitis, 3.—25 per cent. Of these, 86, or 19 per cent., died as a result of the complicating affection.

Hessert⁷⁹ gives an analysis of 366 cases of enteric fever under observation in Cook County Hospital, Chicago. Of the total number 97 (about 27 per cent.) were in females. The distribution according to age was as follows: Under 15, 6 cases; between 15 and 25, 181; between 25 and 35, 132; between 35 and 45, 26;

between 45 and 55, 11; between 55 and 65, 2; not known, 8. There were 48 deaths (13.1 per cent.), distributed as follows: between 15 and 25, 21; between 25 and 35, 14; between 35 and 45, 6; between 45 and 55, 1; between 55 and 65, 2; not known, 4. The duration of the individual attack varied from three to five weeks. An undoubted eruption of rose-spots was observed in 136 cases (37 per cent.). A young negro, of chocolate hue, presented a typical eruption, the spots being somewhat faint, but characteristic. Enlargement of the spleen was always demonstrable by percussion or palpation, unless obscured by distension of the stomach or intestines. It could frequently be palpated when the percussion-note in the usual situation of the spleen was tympanitic. The spleen could be plainly felt in 43 per cent. of the cases, palpation being prevented in many cases by tenderness, tympany, or rigidity of the abdominal walls. Delirium was noted in 32 cases (9 per cent.); it was mostly of a low, muttering type, rarely maniacal. Tympanites to a degree sufficient to warrant treatment was noted in 15 cases, and was, as a rule, readily controlled by the usual remedies. In 2 cases, however, which terminated fatally, it was excessive and obstinate. Excessive diarrhoea was observed in 17 cases, although constipation seemed more commonly to prevail. Vomiting was common among the females, but rarely so severe as to unfavorably affect the general condition. Haemorrhage from the bowels, more or less copious, occurred in 28 cases (7.6 per cent.); of this number, 16 terminated fatally. Perforation of the bowel occurred in 4 cases (a little more than 1 per cent.); 3 of these terminated fatally. Croupous pneumonia appeared in 6 cases, of which 2 terminated fatally. Crural thrombo-phlebitis was observed in 7 cases; nephro-typoid in 3; bilateral parotiditis in 1; herpes labialis in 1; splenic leukaemia in 1. In 2 cases there was an absence of febrile elevation of temperature; 1 of these terminated fatally, and the autopsy disclosed the presence of typical ulceration and enlargement of the spleen. Elevation of the temperature, after it had partially or wholly subsided for a variable period, accompanied by an aggravation of the local and general symptoms, was noted in 20 cases, but in not more than half of these did the recrudescence correspond with von Ziemssen's definition of a relapse. The treatment consisted in the administration of an absolute liquid diet, either milk (peptonized or not), strained oatmeal-

gruel, or soups; a sponge-bath was given when the temperature reached 103° F. (39.5° C.), and an enema every second day if the bowels were constipated. Sponging was practiced with cold or warm water, sometimes with the addition of alcohol, the patient being wrapped in a wet sheet and sometimes covered with blankets. The hot pack was employed, as was also rubbing with ice. On a few occasions full cool baths were given; and in some instances the patient was left in a pool of cool water in a bed covered with a rubber sheet. All of the cases received the treatment outlined, while one-half received, in addition, from 5 grains (0.32 grammes) to 15 grains (1 gramme) of salol every four hours. Besides, an initial dose of calomel was given in every case. No definite conclusions could be drawn from a comparison of the results in the two sets of cases.

Richardson, of London,⁶⁷³ refers to cases presenting a group of symptoms that ultimately prove to be instances of enteric fever, but which in the beginning appear to be either meningeal or pneumonic. Thus, a man, in perfect health when he went to bed, was suddenly awakened in the night by the crash of his bed-room window-panes, followed by violent knocking at the door of his house. He awoke, feeling as if he were stunned by the noise and alarm; he became sick and giddy, and soon was rendered semi-delirious from extreme pain within the skull. In a few hours he presented 4 degrees of fever on Fahrenheit's scale (2.2° C.), a tongue furred, with red margins and tip; great thirst, and extreme restlessness. Within forty-eight hours the symptoms passed generally into those of true typhoid, with well-marked lenticular cutaneous rash, and with intestinal derangements of the most typical character. This condition is called typhoid, but the qualification traumatic is added. It is explained as being from the first the result of a nervous shock, probably of the sympathetic system, followed by a reaction in which the digestion was modified, and upon which the specific disease was developed, as if from a toxic product generated in the alimentary canal.

Another example, of a somewhat different kind: A healthy man reclined on the bank of a lawn in the warmth of summer. He half-slept or dozed, and suddenly awakened with the fact before him that he was breathing a foul air. He looked about and learned that he had been resting close to the mouth of a cess-

pool. He felt sick, was giddy, retched, was conscious of some intestinal pain, with eructation, and soon was seized with acute headache, fever, and delirium. In six hours he was definitely in fever, with some difficulty of respiration and hacking cough. Evidence was found of pneumonia at the posterior base of both lungs, but the clear indications of enteric fever were most striking. In forty hours the lenticular rash was developed, and in the end enteric fever of unmistakable character was presented.

It is believed that these classes of enteric fever (as distinct from those in which there is an incubation period following upon some real or assumed toxic material taken as food or drink) are of far more common occurrence than is usually supposed. They are cases of nervous origin, and are supposed to commence within the body without any introduction of specific virus. Whether they become themselves contagious, by elimination of toxic products, is not sure, but the probability is strongly in favor of that view. All the symptoms that lead to what is called "typhoid" indicate its nervous origin. The disease is to be considered a paresis, affecting the intestinal sympathetic nervous system. There seems to be no other way of accounting for the lenticular rash and for the distinguishing aberrations connected with the digestive system. The fever is as the radiation from relaxed vessels surcharged with blood. The exhaustion is exhaustion due to the dissipation of radiant vital heat, and, if there be a modified zymosis, owing to the presence of fermentative substance, that would mean a substance itself generated by the nervous disturbance.

Filipovich, of Odessa, ⁶ _{Aug. 19} has observed, in all of the cases of enteric fever that came under his notice in the course of two extensive epidemics, a peculiar induration and yellowish or orange tint in the prominent portions of the plantar and palmar surfaces, instead of the reddish color in healthy subjects, or the bluish tinge encountered in cyanotic patients. This peculiar appearance is accounted for by the enfeebled action of the heart, the incomplete filling of the capillaries, and the dryness of the skin. The sign was so constant and so well marked that it is believed that in a doubtful case it may afford material assistance in diagnosis. The phenomenon has also been observed by Skibnevski, of Moscow. An editorial writer ⁹ _{Oct. 24} states that this sign has long been known to many physicians, whose attention was called to it by the late Dr. Ellwood

Wilson. In some observations made at the Philadelphia Hospital during a number of weeks, examination of the hands and feet of every fever-patient disclosed the presence of the sign in every case of enteric fever, and its absence from all other cases of febrile disease, with the exception of one case of acute tuberculosis and one of acute pneumonia. In neither of these exceptional cases was the discoloration so marked as in the enteric cases. The sign is, however, not invariably well marked, even in cases of enteric fever. The opinion is ventured that, while not pathognomonic, the sign is interesting and should count with others in making a diagnosis.

Laveran,¹⁴ has reported three cases of enteric fever in which the characteristic lesions were present in a pronounced degree in the large intestine. In one case the follicles throughout the entire length of the large bowel were in a state of infiltration, without ulceration; in the second case there were numerous points of confluent ulceration; and in the third the ulceration had reached a more advanced stage, even having given rise to perforation. It has been stated that, clinically, involvement of the large intestine in the course of an attack of enteric fever is to be recognized by the seat of the pain induced upon pressure, by the degree of meteorism, and by the copiousness of the diarrhoea. In one of the cases reported the pain was intense and referred to the left hypochondrium, but there existed a peritonitis, at first local, but later general. In none of the cases was the diarrhoea excessive. In only one was the meteorism pronounced. In this the distension was more marked above than below the umbilicus, and followed the course of the colon, which after death was found greatly distended and perforated. Rendu,¹⁴ also refers to two cases of enteric fever in which only the mucous membrane of the large intestine was involved in the inflammatory process. In one of these meteorism was present, but without noteworthy diarrhoea. Hanot,¹⁴ has related three cases of the kind under his observation, none of which presented dysenteric stools.

Rogers, of St. Paul, Minn.,¹⁰⁵ describes a case of enteric fever attended with subnormal temperature in a colored boy 18 years old. Although at the outset the temperature reached 103.4° F. (39.7° C.), it soon declined to 95.2° F. (35.1° C.), and during fourteen days fluctuated between this and 99° F. (37.2 C.). On the fifteenth day, through a misunderstanding, the patient was

given soft-boiled eggs, toast, and oatmeal, and the temperature rose to 102.5° F. (39.2° C.), but on the following day it had again fallen to 97.2° F. (36.2° C.). Suitable treatment was followed by recovery. Dreschfeld, of Manchester, Eng.,¹⁵ has reported four cases presenting symptoms and physical signs of enteric fever, but without elevation of temperature. One of the cases terminated fatally, and in another it is thought that perforation of the bowel took place. Laroussinie¹⁶⁴ observed a case in an insane patient presenting anomalous symptoms. There were vomiting, meteorism, somnolence, constipation, elevation of temperature, and slight bronchitis; but no epistaxis, and no gurgling or iliac pain. The spleen was enlarged and the tongue coated. Two rose-spots finally appeared. The right side of the face presented evidences of vaso-motor derangement: the cheek was red; the pupil dilated. The pulse was frequent and small. The case terminated fatally, and the autopsy disclosed, in addition to the lesions of enteric fever, the existence of a meningo-encephalitis. Leahy, of Chicago,¹³⁹ Mar. describes the case of a man, 21 years old, in whom, in the third week of an attack of enteric fever, a copious discharge from the bowels took place, followed shortly by mild delirium. Two days afterward haemorrhage took place from the nose, eyes, and ears, and a day later from the bowels, succeeded by violent delirium, coma, and death. Chrétien¹¹ has, in three cases, been able to confirm the observation of Bouchard that excessive dicrotism of the pulse is a prodrome of intestinal haemorrhage. In explanation of this fact it is pointed out that the arterial tension is heightened at the time that the haemorrhage is about to occur.

Kiener and Viellard, of Montpellier,¹⁴ Jan. 11 have reported a fatal case in which enteric fever and acute tuberculosis existed simultaneously. At the post-mortem examination the lesions of an acute, disseminated, granular tuberculosis were found in lungs, pleuræ, peritoneum, and pia mater; while the lower third of the ileum presented the typical ulceration of the third week of enteric fever. Bacteriological examination of material obtained by puncture of the enlarged spleen disclosed the presence of micro-organisms corresponding in all particulars with the bacilli of enteric fever.

Girode¹⁴ May 25 refers to the rarity with which enteric fever and cholera are associated, and reports an illustrative instance in a man presenting the symptoms of cholera, comma bacilli being demon-

strable in the intestinal evacuations. Toward the close of the attack symptoms of ataxo-adynamic enteric fever appeared, which pursued an ordinary febrile course and was attended with ochrey diarrhoea and the presence of rose-spots. The stools contained typhoid bacilli, as did also the albuminous urine. Cold-bath treatment afforded transitory amelioration, but the patient died on the seventh day. Upon post-mortem examination the typical intestinal, mesenteric, and splenic lesions of the first stage of enteric fever were found, and typhoid bacilli were isolated in pure culture from the splenic juice. Moreaud ²⁴³ _{Jan.} has reported the case of a soldier, 23 years old, who had had an attack of measles a year before, but who, on about the fifteenth day of an attack of enteric fever, presented elevation of temperature, catarrhal manifestations, a coarse macular eruption, and other symptoms of measles. The morbillous eruption began to disappear in the course of four or five days, when the rose-spots of the primary disease again came into view. Deservescence, however, took place in a few days, and the attack soon terminated favorably.

Complications and Sequelæ.—Hawkins, of London, ⁶ _{July 29}, has made an analysis of 251 cases of enteric fever in children from 2 to 15 years of age, with special reference to the occurrence of intestinal perforation. Of 20 fatal cases perforation occurred in 6. In adults this occurred in 18 cases among 43 that ended fatally. Of the 6 cases of perforation in children 2 were 5 years old, 1 was $7\frac{1}{2}$, 2 were 9, and 1 was 14. Of the 18 cases in adults 2 were between 15 and 20, 6 between 20 and 25, 2 between 25 and 30, 4 between 30 and 35, 2 between 35 and 40, and 2 were 43 years old. Of the 6 cases in children 5 were in males, 1 in a female. Of the 18 cases in adults 10 were in males, 8 in females. That ulceration is not uncommon in children is demonstrated by the fact that, in an investigation of 17 post-mortem examinations, ulceration was found in 3 cases between 3 and 5 years of age, in 10 between 5 and 10, in 1 at 14, and 1 at 15. In the remaining 2 cases death took place on the ninth and fourteenth days, respectively, and no ulceration was found. To ascertain the seat of ulceration the reports of 192 post-mortem examinations were studied. It was found that the ileum was involved alone in 128 cases; in 3 of these small, newly-formed ulcers were found in the stomach, in 2 instances two separate ulcers being present. In the remaining 64 cases the

ileum was ulcerated in all instances, and together with the jejunum in 1, the cæcum in 12, the vermiciform appendix in 4, and the colon in 47 (the ascending colon in 8, the transverse colon in 3, the descending colon in 2, and all parts of the colon in 34). In an analysis of the seat of perforation, as noted in 72 post-mortem examinations, it was found that the ileum was perforated in 61, at distances above the ileo-cæcal valve varying from one inch to six feet, in the majority of cases at distances of six inches, twelve inches, and twenty-four inches. Of the remaining 11 cases the colon was perforated in 5, the cæcum in 3, and the vermiciform appendix in 3. Of the cases in which the colon was involved the perforation was seated in 1 in the ascending colon, an inch above the cæcum (in this case the ileum also was perforated), in 1 in the transverse colon, and in 3 in the descending colon (in 2 in the upper part and in 1 in the sigmoid flexure).

McCall, of Conisborough, Eng., ^{July 8}², has reported a case in which he believes perforation of the bowel to have taken place, with ultimate recovery. The patient, a woman 34 years old, had been nursing her son during an attack of enteric fever. On the sixteenth day of her illness she went into collapse, and presented the phenomena of impending death, together with marked tympanites and great tenderness over the cæcum. The symptoms yielded, however, to active stimulation and artificial warmth. Dullness over the cæcum persisted for some time, and for a brief period there was also some dullness in the flanks. Later in the attack fluctuation became evident in the cæcal region, and subsequently the patient passed an eggcupful of pus by the bowel. Six days afterward 18 ounces (560 grammes) of badly-smelling pus, together with a considerable quantity of gas, were removed, by means of an aspirator, from the area of cæcal dullness. Six days later 8 ounces (250 grammes) more of pus were removed. After this the woman made an excellent recovery and was restored to her usual health.

Symes, of Dublin, ¹⁶_{Apr.} observed a case in a married woman, who was a cook in a large house in which the sanitary arrangements were markedly deficient, the soil-pipes passing to the main drain through the kitchen and dairy, the former close to the fire and the latter beside the milk-pails. The pipes were not ventilated and sewer-gas also leaked into the house through the sinks, from which

the escapes directly entered the down-soil pipes. The woman suffered with "sick headache" and diarrhoea for a week before taking to bed. The fever was of malignant type and attended with low adynamic symptoms. For ten days there was incontinence and for three days delirium. The diarrhoea was not excessive, but the stools were extremely offensive. The most troublesome symptoms were headache, sleeplessness, and restlessness, which were efficiently relieved by freely leeching the temples. On the eighteenth day there was slight haemorrhage from the bowels. On the twenty-seventh day symptoms suggestive of the onset of pericarditis or endocarditis appeared, although no friction-sound or murmur could be detected. The question of perforation was also considered, but an absolute diagnosis was scarcely possible. In the course of the next few days phlebitis developed in both lower extremities, and chills occurred on several occasions. On the fifty-first day a fresh crop of rose-spots appeared. From the fifty-fourth day the fever gradually subsided by lysis. From the sixty-first to the ninety-second day a state of oliguria existed, the average amount of urine excreted daily being a little more than 10 ounces (310 grammes) and the average specific gravity about 1026. Albumen was found present on the sixty-third, seventy-third, seventy-fourth, seventy-fifth, and eighty-third days; hyaline, oily, and granular tube-casts on the seventy-eighth day; anasarca appeared on the sixty-seventh day. On the seventy-fifth and seventy-sixth days, the stools, washed and examined, were found to be composed almost entirely of shreds of intestinal epithelium, which floated on water. On the seventy-eighth day there was some haemoptysis proceeding from the apex of the right lung and recurring on the eighty-third day. Ultimately, after an illness of nearly three months, convalescence set in.

Hayes, of Dublin,^{18 Aug 1} has reported a case of enteric fever in a man 20 years old, who came under observation on the tenth day of his illness. Four days later he had two sharp haemorrhages from the bowel. In the course of a week the temperature gradually began to decline, but convalescence was interrupted by a relapse. For a time diarrhoea was replaced by constipation, but on the twenty-fifth day diarrhoea re-appeared, and was followed on the next day by two considerable haemorrhages. On the thirty-second day of the relapse the patient's gums began to bleed rather freely and blood

appeared in the urine. At the same time blood appeared in the intestinal evacuations, as if from continued oozing rather than from a perforated vessel. Previously and up to the appearance of the purpuric manifestations the patient had been taking 15 grains (1 gramme) of spirit of terebinth as a punch with brandy, but on the appearance of the haematuria the turpentine was withdrawn. After the purpura had persisted for several days, apparently uninfluenced by the administration of several haemostatic drugs, the turpentine was resumed, and almost immediately the haemorrhages began to decline and finally ceased. During a part of the course of the attack the temperature-curve exhibited well-marked variations of a malarial type, in addition to the usual diurnal variation of enteric fever. Each third day the temperature suddenly rose 3° or 4° F. (1.6° to 2.2° C.), and as suddenly sank to a level about that at which it had previously stood and remained there, with the usual daily variations, until the third day following, when the same large rise and fall took place. These extreme elevations of temperature were accompanied by a condition of severe rigor, lasting sometimes for a period of half an hour, the fall of temperature being accompanied by profuse sweating and collapse. This state of affairs lasted for fourteen days, the purpuric symptoms showing themselves at about the middle of this period. There was no previous history of malarial infection. Recovery ultimately took place after a tardy convalescence.

Debongnie, of Belgium,⁴⁵⁴ relates the case of a soldier who was apparently entering upon convalescence from an attack of enteric fever, free from complications, when rather a copious haemorrhage from the bowel took place. The patient complained of pain referred to the buttocks, and examination disclosed the existence of a soft, fluctuating tumor in the ischio-rectal fossa. An incision gave exit to pus and faecal matter. The inner opening of the fistula was found at a depth of from twelve to fifteen centimetres, the perforation being situated above the levator ani muscle. In view of the precarious condition of the patient, the abscess was treated by means of antiseptic irrigations. The wound appeared to be progressing favorably, when the patient began to pass gas by the urethra and the urine presented a faecal appearance and odor. By providing for a free discharge from the ischio-rectal wound, by means of the actual cautery and the gorget, the communication

between the bowel and the bladder closed, and, after a considerable time, the ischio-rectal fistula also cicatrized. It is believed that the haemorrhage and the ischio-rectal abscess were both the result of the presence of ulceration in the rectum. Vance, of Louisville, ^{Aug. 28} has reported the case of a girl, 9 years old, in which, in the seventh week of an attack of enteric fever, the umbilicus became tender, a little red, and pouting. Two weeks later a small opening appeared and a good deal of pus was discharged. Expectant treatment was employed for some time, but finally an exploratory operation was undertaken. An incision was made in the median line, from the umbilicus as a centre, and a large quantity of pus of pronounced faecal odor, together with some solid matter, was evacuated. The abdominal wall, from the ilium to the ribs, was entirely separated from the parietal peritoneum, and this surface was suppurating from the opening made back to the loins. The hand was introduced for the purpose of discovering the source of the trouble, but no intestinal perforation could be found. The whole area was thoroughly washed out and packed with iodoform gauze. Subsequently counter-openings had to be made and drainage-tubes introduced.

Eskridge, of Denver, ⁷² describes the case of a man, 25 years old, in which, during convalescence, stiffness and pain in the sacral region was complained of. There was a previous history of syphilis and pains in various joints. The stiffness and pain disappeared after the patient began to be about, but returned when he resumed work as a hostler, and he was finally compelled to take to bed again. In addition to the sacral pain there was also pain referred to the left side of the pelvis. In walking the left foot was held in advance of the right, but in attempting to walk normally great pain followed on placing the left foot in front of the right, or on permitting the left to lag far behind the right. The pain appeared to be caused by attempts to put the flexors and extensors of the left thigh upon the stretch. Pressure over the first sacral spine gave rise to pain, shooting down the posterior aspect of the left thigh, in the area of distribution of the small sciatic nerve. Attempts to bring the straightened leg forward were attended with pain in the sacral region, in the left hip, and on the posterior aspect of the left thigh. On putting the leg backward the pain was referred to the sacral region. The knee-jerks were exag-

gerated, but ankle-clonus was absent. The left leg presented some hyperesthesia. An area as large as a silver half-dollar on the anterior aspect of the right thigh was anesthetic. Upon simultaneous pressure upon both ilia pain was complained of in the left sacro-iliac joint, and extending from one side of the pelvis to the other. By excluding myelitis, sciatica, hip-joint disease, tumors of the pelvis, and malingering, a diagnosis of periostitis of the pelvic bones, perhaps associated with a localized pachymeningitis, in the sequence of enteric fever was made.

Grancher, of Paris,¹⁴ states that, in the case of a boy 12 years old, during the period of deservescence of an attack of enteric fever of not unusual character, suppurative synovitis developed at the instep. In the pus evacuated only the bacilli of enteric fever were found. In the course of a week manifestations of phlegmasia alba dolens appeared, from inflammation of the left saphenous vein. Finally, a relapse occurred. Recovery was, however, ultimately perfect. The phlebitis, like the synovitis, was ascribed to the presence of the bacilli of enteric fever. In the case of a child of 9, presenting symptoms of enteric fever, the frequency of action of the heart was greatly increased, and the rhythm partook of the character of that of the foetal heart,—modifications ascribed to a myocarditis depending not upon intoxication, but upon infection by the specific organisms of the primary affection.

Chantemesse and Widal, of Paris,¹⁴ have reported the case of a woman, 42 years old, in which, during convalescence, fatal suppurative nephritis and perinephritis developed. A post-mortem examination could not be made, but the diagnosis seemed undoubted. During life there had been an appreciable swelling in the loin and uræmic symptoms; the urine was albuminous and purulent, and contained bacilli coli communes in almost pure culture.

Weintraud¹⁴ has reported the case of a man, 19 years old, who had had a left-sided exudative pleurisy three years previously, and who, toward the close of the second week of an attack of enteric fever, began to show subjective and objective symptoms of pleuritic effusion. Exploratory puncture showed the presence of pus in the left pleural cavity, and bacteriological examination disclosed the presence of bacilli corresponding to those of enteric fever.

The puncture was repeated later on in the same situation, and the pus contained bacilli like those found in the fluid first removed, but much less virulent. Immunity to inoculation with virulent organisms was conferred upon animals treated with pus obtained at the second puncture. Funck, of Brussels, ⁸⁶⁸ _{May 20} reports two cases of enteric fever complicated by peripheral neuritis. The one occurred in a man 19 years old, pain in the thigh appearing suddenly, during convalescence, on the twelfth day after defervescence had occurred, following an attack of moderate intensity lasting about four weeks. Subsequently, loss of power appeared, with wasting and reactions of degeneration. Perfect recovery ensued after the lapse of a number of weeks. The second case occurred in a woman 41 years old, pain in the right lower extremity appearing at the height of a relapse, on about the thirtieth day of the illness, and being shortly followed by palsy.

Schamberg, of Philadelphia, ¹¹² _{Dec. 22} saw a case of enteric fever in a man 32 years old, in which for a week the temperature ranged in the neighborhood of 104° F. (40° C.), subsequently falling. Irritability and restlessness were marked from the outset. On the ninth day delirium manifested itself. On the ninth and tenth days vomiting took place, and on the twelfth day hiccup for twenty minutes, continuing intermittently most of the thirteenth day and, in association with attacks of vomiting, for the next five days, and without vomiting on the nineteenth day. On inquiry, it was learned that the patient had previously frequently had attacks of hiccup. He was dismissed on the forty-second day of his illness. Hawkins, of London, ² _{Dec. 17, 192} has collected from various sources sixteen cases of hemiplegia in the course of enteric fever. The patients varied from 2 to 30 years of age, the majority being males. The earliest period at which the complication occurred was during the second week, but in most instances it occurred during the third or fourth week, and during convalescence. In one case it did not occur until the eighth month. Most cases terminated in complete recovery; in a few the paralysis remained permanently, and in some cases death ensued. The right side was much the more frequently affected. Aphasia was generally present. The condition was believed to be a consequence of a non-valvular lesion of the heart, leading to the formation of thrombi in the left auricle, whence emboli were detached, carried to and lodged in a cerebral artery.

Sallès ²¹¹_{Jan. 15} observed what he considered to be obliterative arteritis in a boy of 11 years, developing abruptly on the eighteenth day of an attack of enteric fever, in which there were no other complications. Le Gendre ¹⁴_{Mar. 26} reported the case of a man of 20, in which, on the forty-second day of an attack of enteric fever, and several days after the occurrence of defervescence, the temperature again rose without apparent cause. Shortly afterward a scarlatiniform eruption appeared, at first upon the face, then upon the extremities and abdomen, invading successively the back, the genitalia, the buccal and pharyngeal mucous membranes. The erythema was soon followed by extensive desquamation in large sheets, and the two processes continued until the death of the patient, on the one hundred and second day of the attack and sixty days after the first appearance of the exanthem. At this time the nails were almost ready to fall off; the brows had fallen out, and a good deal of the hair of the head had been lost. Throughout this secondary condition the temperature had continued irregularly elevated. The highest temperature coincided with the appearance of pulmonary symptoms: cough, dyspnoea, and the expectoration of sputum containing tubercle bacilli. No evidence of pulmonary disease had previously been detected, but now there were signs of a cavity in the lower lobe of the right lung. At the autopsy a number of tubercles in process of caseation were found, and an abscess in the lung as large as a mandarin. In the lower portion of the ileum, in the neighborhood of the ileo-caecal valve, there were numerous small, rounded ulcerations in process of cicatrization and evidences of previous ulceration. Cultures made from the scales of skin from the upper and anterior aspect of the chest developed a micro-organism indistinguishable from the bacillus coli communis.

Barr, of Liverpool, ¹⁸⁷_{July} describes the case of a man, 20 years old, who had a severe and protracted attack of enteric fever, complicated by hyperpyrexia, vasomotor paresis with pulmonary oedema, bilateral pneumonia, erythema, empyema, pericarditis, and an encysted accumulation of pus in the mediastinum. The treatment was vigorous and varied and recovery ensued.

From a study of insanity after enteric fever, Bauduy, of St. Louis, ³⁶⁴_{Feb. 18} ascribes a prominent rôle to (1) heredity, by producing an "unstable constitution of nervous equilibrium"; (2) disturb-

ances of the nerve-centres themselves, of which fever is but too often merely an expression or clinical manifestation; (3) anæmia, the direct result or anatomical substratum of the febrile process, or excessive and prolonged temperature elevation, causing "irritable weakness"; (4) toxic perturbation of nervous nutrition, superinduced by the retention of effete or excrementitious materials, resulting in qualitative blood-changes, with corresponding metabolic and somatic tissue or textural perversions; and (5) microbial invasion of special nerve-centres, preventing their normal physiological functional activity,—all of which lead to the development of a cachectic, anæmic condition of the cortical nerve-centres.

Mabit ¹⁶² _{June 25, 1892}, ² has recorded the case of a woman, 29 years old, married eight years, who at the age of 19 had an attack of enteric fever, keeping her in bed for two months, and followed by violent pains in the left iliac fossa, which continued for a month. After marriage the suffering increased and febrile attacks occurred. The left oviduct was found tender and much enlarged, the left ovary prolapsed and sensitive to touch. After a long course of varied treatment the tender swelling to the left of the uterus disappeared and the woman was greatly improved. Menstruation, however, failed to return.

Elliott, of Dublin, ² _{Oct. 22, 1892} relates the case of a man, 35 years old, who had a tape-worm for two years, and was seized with enteric fever. The acute illness kept the man in bed for four or five weeks, during one period of which he had a sharp attack of diarrhœa, without, however, passing any portion of the worm. On the second day after getting up he passed segments, and indications of the presence of the parasite continued for some months despite active treatment, but they finally disappeared. Reynolds, of Wolverhampton ⁶ _{Dec. 24, 1892} has reported the case of a boy of 14, who, in what appeared to be a second relapse of enteric fever, passed a round-worm ten or eleven inches long.

Hanot ³¹ _{Dec. 29, 1892} points out that a previously latent syphilis may be rendered active by an attack of enteric fever, and that previous infection with syphilis aggravates the prognosis. Considerable discretion is required in the treatment, which does not differ in principle from that pursued under ordinary conditions.

Relapses.—Frankenhäuser, of St. Petersburg, ²¹ _{Sept. 2} reports the results of an analysis of 274 cases of enteric fever with reference

to relapses. There were 26 true relapses (9.5 per cent.), these, as well as pseudo-relapses, depending, according to the author, upon the development of a new generation of typhoid bacilli, although it may be possible that the spores were derived from the bacilli upon which the primary attack was dependent. The notion of re-infection is scarcely admissible, while errors in diet, excitement, and exertion have no real causative influence. The frequency of relapses varied in different years, and appeared to bear no relation to the method of treatment employed. The largest number occurred in patients between 15 and 30 years, but the percentage was larger in those over 30 years of age. The nutritive condition seemed to bear no relation to the occurrence of a relapse or to its severity. The apyretic interval between the primary attack and the relapse appeared to bear an inverse ratio to the severity of the latter. The duration varied from four to thirty-seven days. The largest proportion of relapses followed severe primary attacks.

From a study of 1559 cases of enteric fever, Podanowski⁸⁵⁹
Nos. 1 to 17 comes to the conclusion that there is a typical and an atypical form of relapse, which are to be carefully differentiated. Relapses occur as a result of the action of the same poison that caused the primary disease; the view of renewed infection is not admissible; they are not common, and usually occur in the autumn and winter months. Sex and age have no influence upon their frequency. The typical form occurs generally after mild, the atypical forms after severe, attacks. The frequency is not related to the character or the intensity of the epidemic, although the mode of treatment and the surrounding conditions may have some influence. With a careful *régime* and indifferent treatment the frequency of relapses is minimized. The longer the continuance of the primary attack and of the apyrexia, the shorter the duration of the relapse.

Diagnosis.—Baruch, of New York,¹ points out the importance of the early diagnosis of enteric fever, and goes so far as to say that the successful issue of the case is almost assured if the bath treatment, according to the method of Brand, is inaugurated prior to the fifth day of the disease. In a doubtful case, as soon as the patient shows a rectal temperature of above 102.5° F. (39.2° C.) in the morning and 103° F. (39.5° C.) in the evening for three successive days, he is placed in a full bath at 90° F. (32.2° C.), which is reduced to 80° F. (26.7° C.) while friction of

the body is practiced. If after three hours the temperature is still above 102.5° F. (39.2° C.), another bath is given at 5° F. (2.9° C.) lower. This procedure is repeated until a temperature of 75° F. (23.8° C.) is reached. If one or more of these baths fail to reduce the rectal temperature 5° F. (2.9° C.) in half an hour, the diagnosis of enteric fever is almost certain, and the bath-treatment is continued. The point emphasized is that the resistance of the rectal temperature to a bath of 75° F. (23.8° C.) for fifteen minutes, with friction of the body, is an almost certain test of enteric fever.

Georgevitch, of Paris,²³ calls attention to the fact that in children the ataxic type of enteric fever sometimes closely simulates tuberculous meningitis. Under these circumstances there may be convulsions, delirium, and ocular palsy; these are, however, rare at the initial period of the attack. The differential diagnosis is always difficult and sometimes impossible. In the ataxic form in children, however, the prodromic period is relatively short, sometimes being entirely absent; the temperature is more or less pronouncedly continued and without absolute remissions; the pulse is not irregular and intermittent, and there is no parallelism, relative or absolute, between the frequency of the pulse and the elevation of temperature; the abdomen is usually tympanitic and rarely retracted; enlargement of the spleen is more constant and more decided; mental irritability is less pronounced. The ataxic form of enteric fever may manifest itself by the lateral decubitus, with the limbs drawn up; by irregular contractions of the face, opisthotonus, and cutaneous hyperesthesia. The presence of râles, scattered throughout the lungs, is in favor of a diagnosis of enteric fever.

“Transylvania”⁸¹⁴ describes as gastric fever a non-contagious febrile affection, endemic in the mountains of western North Carolina, at an altitude of 2500 feet, and in a latitude free from the extremes of summer heat and winter cold. The fever is of continued type, of abrupt onset, and characterized by the occurrence of chills, headache, nausea, and vomiting. Jaundice is, as a rule, present and epigastric tenderness almost always. The tongue is usually coated, except at its edges, which are red. Constipation is the rule. The temperature declines as suddenly as it rises. There is sometimes a tendency to delirium. The average duration

of the disease is about nine days. One of the most notable features is the sudden and great loss of flesh that occurs. The prognosis is favorable.

Management.—In a study of the influence of increased nourishment upon children suffering from enteric fever, Kissel ⁵⁸⁶₂₁ ²¹_{Nos. 16, 28; Dec. 10, '92} found that, even if the amount of nutrition be decidedly increased, a certain degree of inanition results, as manifested by loss of body-weight. The body-temperature is, however, thereby not elevated. In many cases there was no derangement of digestion; a tendency to constipation predominated. The number of complications was not increased, nor was the febrile stage prolonged. The subjective condition was not made worse. Relapses were not observed. At first there was a disinclination to take the excess of food, but subsequently there was a ready acquiescence. It could not be determined whether or not recovery took place earlier, as control observations were not made. In many cases the duration of the disease had no influence upon the daily loss of weight.

Püritz ²¹_{Feb. 11} (see ANNUAL, 1893, H-53) has found that enteric-fever patients are able to assimilate considerable amounts of albumen, both during the febrile period and in the first days of the afebrile period. The assimilation is slightly less in case of forced feeding during the febrile stage than in case of insufficient nutrition, the period of the disease, however, exercising no influence upon the amount of assimilation. In case of forced feeding with highly albuminous food, an increased amount of nitrogen is excreted in the urine. The amount of nitrogenous metabolism diminishes, notwithstanding its increased intensity. The daily loss of nitrogen and of body-weight is diminished during the febrile stage. In case of forced feeding, with a corresponding supply of water, the quantity of urine is increased, although albumen is not caused to appear in the urine. Forced feeding causes no elevation of temperature or gastrointestinal derangement. The stools become fewer and a tendency to constipation is developed. In no cases were complications or a prolongation of the disease noted. The well-being of the patient and his organic functions were improved; while convalescence was more speedy and more substantial than under ordinary circumstances.

Treatment.—Sihler, of Cleveland, ⁶¹_{July 22} makes a warm plea for the employment of the Brand bath in private practice. He has

used the method for three and one-half years, during which time he has thus treated more than ninety-five cases, principally among artisans and laborers, with over five thousand baths, in no instance with a mishap or a dangerous symptom dependent upon the bath. Thompson, of New York, ⁹⁶¹_{July 15}, is also an advocate of this method. (See vol. v, Sec. E.) Cantalamessa ⁵⁰⁵_{Mar. 7,} ¹⁰⁶⁹_{May} reports the results of the treatment of one hundred and twenty cases of enteric fever by means of prolonged baths, the patient being supported in the bath upon a sort of hammock. The duration of the bath was ordinarily from five to eight hours, although in one case it was eighteen hours. The temperature at the beginning was 87° F. (30.6° C.), but it was gradually reduced by the addition of ice to 75° F. (23.9° C.). The first effect of the baths was a notable improvement in the respiration and circulation; the secretion of urine was usually increased, but occasionally, owing to the reduced thirst and the consequent diminished consumption of fluids, it was lessened in amount; the quantity of urea was diminished about half. Among the whole number of cases there were five deaths, two from perforation almost immediately after coming under observation. It is suggested that relapses, which are more common in cases that have been treated by means of baths, may be due to the fact that there are fewer deaths.

Finding it difficult to carry out the cold-bath treatment of enteric fever, and observing that the temperature of patients thus treated rose again in a short time after being put to bed, Samuel Fenwick, of London, ¹⁰⁷⁷_{Feb. 16}, came to the conclusion that the early recurrence of the pyrexia was, to some extent, the result of warmth produced by the bed-clothes. To obviate this difficulty, he devised what he calls an ice-cradle. This consists of an ordinary iron cradle, sufficiently long to cover the patient in his entire length, and broad enough not to limit his movements and thus prove irksome. Under this the patient lies, covered by some light and opaque muslin. Attached to the cross-bars of the cradle are small zinc buckets, in which ice can be placed. The outer surface of the buckets should be covered with lint, to prevent any of the condensed moisture from falling on the patient. The cradle is covered with a counterpane, except at the two ends, which are left open to allow of a constant interchange of air. A hot bottle should be placed at the patient's feet, and before the cradle is used

he should be well sponged with tepid water. It is maintained that by this means the temperature can be reduced as efficiently as by means of the bath. Its advantages are the extreme ease with which it can be employed, the absence of discomfort from moving the patient, and, with proper restrictions, the length of time it can be used, thus permanently keeping the temperature down. Ice is not necessary in all cases, the continual surrounding of the body by the air at its ordinary temperature being often sufficient. Hammerschlag⁶⁹ _{Nov. 30; Aug. 12}² has reported five cases treated by the transfusion of blood from convalescent cases, with results that are considered indefinite. In one case a remarkable decline of temperature took place the night following the injection, but on the following evening the temperature had resumed its previous level. One of the cases terminated fatally. In three cases the blood was taken from patients only recently free from fever; in the other two they had been afebrile for from five to seven weeks. Hughes and Carter have treated several cases, at the Philadelphia Hospital, with blood-serum obtained from convalescent cases, but, although in some instances a decided impression was made upon the temperature, it cannot be said that curative results were obtained in any case.

Spence, of New York, ⁵⁰ _{Nov. 26, 1892} reports the results of analysis of 323 cases of enteric fever treated in St. Francis Hospital, from October 1, 1884, to January 1, 1892, upon the expectant plan, with a mortality of 47 deaths—14.23 per cent. Of these 47 cases, 12 were moribund or so weak on admission that they died within forty-eight hours. Deducting these 12 cases, the mortality would be reduced to 11.25 per cent. In the way of treatment a dose of 5 or 10 grains (0.32 to 0.65 gramme) of calomel was administered at once, if the disease was not too far advanced; whisky was given when stimulation seemed necessary; the cold pack was used when the pyrexia was high and continued,—*i.e.*, over 105° F. (40.6° C.); when possible a water-bed was used in cases of pyrexia, but only occasionally was antifebrin or phenacetin given, and then only in single doses; troublesome diarrhoea was treated with bismuth combined with small doses of opium, or, if obstinate, 5-grain (0.32 gramme) doses of naphthalin were given every two hours until relief was afforded; in case of intestinal haemorrhage, tincture of opium was administered in doses of 5 or 10 drops, at short intervals, until the desired effect was secured. The diet was

wholly a liquid one, consisting, for the most part, of milk, together with strained meat-broths, and was thus continued until the temperature had been normal for a week. Even then great care was taken, and a full diet was only gradually reached. The patient was not permitted to rise or leave his bed under any circumstances. The cases came mostly from the lower walks of life, including the hard-worked and poorly nourished, exposed to unfavorable hygienic conditions, and, as a rule, entering the hospital as a last resort. Of the 47 fatal cases, death took place in 22 (6.8 per cent.) as a result of the intoxication and exhaustion due to the disease; in 11 as the result of the intestinal lesions; in 4 from pneumonia; in 1 from pharyngeal diphtheria; in 1 during a relapse; the remaining 8 were moribund on admission.

Tortchinsky⁸⁵⁹ _{No. 45,72} has employed boric acid in the treatment of 240 cases of enteric fever in the course of an epidemic, with excellent results, only 9 terminating fatally, and these during the period of convalescence, from arising too early or from indiscretions in diet. In the remaining 231 cases, convalescence was speedy and complete. In all cases from 2 to 4 drachms (8 to 16 grammes) of castor-oil, with from 5 to 10 drops of essence of turpentine, were given at the outset. After this had acted, the administration of boric acid was begun, from 75 centigrammes ($11\frac{5}{8}$ grains) to 1 gramme ($15\frac{1}{2}$ grains) for an adult and from 18 to 75 centigrammes (3 to $11\frac{5}{8}$ grains) for a child being given three or four times a day. In case of a complicating bronchitis, expectorants and hydrochloric acid were combined with the boric acid. As a rule, fever and diarrhoea subsided at the end of from three to five days; the tympanites disappeared; the stools lost their offensive odor and assumed a natural appearance; the urine became abundant and normal in constitution; the tongue and skin became moist, and the subjective condition was improved. As soon as marked amelioration had taken place, the acid was discontinued and tonics were substituted. Under this course of treatment the disease pursued a favorable course and complications were rare. The best results were obtained in cases that came under observation early. It was found that the good effects of boric acid were augmented by the conjoint administration of small doses (from 8 milligrammes to 3 centigrammes— $\frac{1}{8}$ to $\frac{1}{2}$ grain) of antifebrin, quinine, naphthalin, or salol. The combination with quinine was especially useful in the

last stages of the disease, marked by ataxia, delirium, and other cerebral manifestations ; it was also useful in cases of relapse. In no case were bad results observed to follow the treatment.

Posajnyi ⁸⁵⁹_{Nov. 22, 1912} ; ²_{Dec. 31, 1912} has employed salol in the treatment of 49 cases of enteric fever, in patients ranging from 11 to 32 years of age, severe diarrhoea, meteorism, or indicanuria being present. About 50 per cent. were complicated by bronchitis, catarrhal pneumonia, otitis, nephritis, and other conditions. The daily dose of the drug varied from 0.35 to 1.5 grammes (5 to 24 grains), given in three equal parts, for from one to eighteen days. Of the 49 patients 3 died (from complications : croupous pneumonia, catarrhal pneumonia, and pachymeningitis) ; relapse occurred in 1 ; intestinal haemorrhage in 2. In about 25 per cent. of the cases the salol appeared to have no favorable effect upon the patient's condition ; but in the remaining 75 per cent. the intestinal fermentative processes appeared to be markedly inhibited. In the latter the stools quickly lost their specific features, while the abdominal distension and tenderness subsided, the appetite improved, and the proportion of indican in the urine gradually decreased. In about 25 per cent. of the cases the diarrhoea and other symptoms ceased after one or two days of treatment, and did not recur after the withdrawal of the drug. Not infrequently constipation occurred, necessitating the employment of enemata. No antipyretic effects were observed, nor any unfavorable influence on the heart or kidneys.

Having determined by experiments upon lower animals that pure carbolic acid may be administered internally with safety, and that it inhibited the activity of the typhoid bacillus, Charteris, of Glasgow, ²_{Dec. 31, 1912} had made keratin-coated pills, each containing $2\frac{1}{2}$ grains (0.16 gramme), and so prepared as to be insoluble in the gastric juice, but readily soluble in the pancreatic juice, and with which a number of cases of enteric fever were treated, with satisfactory results, the diarrhoea being moderated and the foetor of the stools being overcome.

Wible, of Munhall, Pa., ¹⁶¹_{Mar.} has reported 48 cases of enteric fever treated with thymic acid, or thymol, with but 3 deaths. Five grains (0.39 gramme) of the drug were administered every three hours. In addition, when there were more than three or four stools during the twenty-four hours, 10 grains (0.65 gramme) of

bismuth salicylate were administered every three hours. Of the 3 cases that terminated fatally, 1 was moribund when it came under observation and died within twenty-four hours. The second came under observation in the fourth week of his illness, having had no previous intelligent care. In the third case death took place five days after the patient came under observation.

Hölscher²⁹⁷, relates his experience with guaiacol carbonate, given in doses of 15 grains (1 grammme), night and morning. The tongue became moist; the appetite returned; the stools, which smelled strongly of guaiacol, gradually assumed a firmer consistency. In some instances constipation developed, but this usually disappeared spontaneously. A favorable influence seemed to be exerted upon the bronchitis, with relief of the dyspnoea and facility of expectoration. Guaiacol carbonate is a disinfectant and not an antipyretic, and when administered alone exercised no influence upon the temperature, but when combined with acetanilid a marked and permanent influence upon the temperature was observed. In the cases thus treated ataxic and adynamic phenomena were uncommon, as well as hallucinations and other cerebral manifestations.

Barkley, of Caseyville, Ky.,⁷⁰⁰ recommends the following formula:—

R Acetanilid, gr. xxiv (1.5 grammes).

Sodii salicylatis, 3ss. (2.0 grammes).

Ammonii salicylatis, 3j (4.0 grammes).

M. et fiat chartulæ no. xij.

Sig.: Take a powder every three hours in an ounce (31 grammes) of hot water, with from 6 to 10 drops of spirit of cinnamon.

If the bowels are constipated, an officinal compound effervescent powder or a dose of castor-oil and glycerin (of each a tablespoonful) is recommended, to be repeated in four hours if necessary. For several consecutive nights 20 grains (1.3 grammes) of quinine are to be given at midnight, with sufficient lemonade or toddy to dissolve it in the stomach. If diarrhoea demand treatment, the following formula will prove useful:—

R Bismuthi salicylatis, 3j (4.0 grammes).

Sodii bicarbonatis,

Sodii sulphitis,

Pulvis opii,

3j (1.3 grammes).

gr. v (0.32 grammes).

M. et fiat chartulæ vel capsulæ no. x.

Sig.: Take 1 every six hours.

After having employed numerous agents in the hope of securing intestinal antisepsis, Brown, of Alexandria, Va., ⁸¹ _{Oct. 22} has selected iodoform, creasote, and calcium sulphide as the most useful. A capsule containing 1 grain (0.065 grammie) each of iodoform and creasote is administered every three hours. If diarrhoea be present, a small quantity of opium is added. In cases in which haemorrhage has occurred the following combination has proved efficient:—

M. flat capsulæ no. xx.

Sig.: Take 1 every hour or every two hours, according to the amount of haemorrhage.

Every third hour a pill containing calcium sulphide, 1 grain (0.065 grammes), is given.

Loranchet ³⁶³ _{Feb. 18, 1912} reports the employment of mercuric chloride in twenty-one cases, with amelioration of the grave symptoms and apparent lessening of those dependent upon intoxication. The tongue remained moist and clean, and there was a noteworthy absence of tympanites. The dose employed was about $\frac{1}{64}$ grain (0.001 gramme) four times a day, in water. Recovery took place in all of the cases.

Assuming that the cell destruction that takes place in the course of an attack of enteric fever is dependent upon the action of the typhotoxin, Thistle, of Toronto,³⁹ contends that the indications to be met are (1) the removal of any portion of poison already formed; (2) the prevention, as far as possible, of the generation of further poison, and (3) the limitation, as far as possible, of the action of the poison already in contact with the tissues. These conditions will best be met by the adoption of a plan of treatment that combines free elimination with antisepsis, together with the administration of generous quantities of water. In thirteen cases treated upon these lines with calomel and salol, the results were eminently satisfactory.

Roussel, of St. Etienne, ^{May 2} has employed antipyrin, in progressively-increasing doses, in ninety-three cases of enteric fever, without the loss of a case. On the first day he gave 10 grains (0.65 gramme) four times, at intervals of three hours; on the

second day, 20 grains (1.3 grammes), morning, noon, and night; on the third day, 1 drachm (4 grammes) in four doses; thereafter, an increase of 20 grains (1.3 grammes) daily until 2 drachms (8 grammes) were taken, leaving an interval of two hours between doses. Drake, of Louisville,¹⁰⁵ reports the successful employment of *baptisia tinctoria*, 10 drops of a fluid extract every four hours until convalescence is established. Vance, of Sonoma, Cal.,¹⁰⁶ expresses the opinion that, when in a young, plethoric subject the onset of an attack of enteric fever is marked by sharp abdominal pain, half a dozen leeches applied over the ileo-caecal region often afford relief. Mason, of Walton-on-Thames,¹⁰⁷ has reported a case of enteric fever, complicated by a painful swelling in the upper part of the left thigh, in a domestic, 22 years old, in which an apparently hopeless condition, attended with a pulse of 172, a respiratory frequency of 84, and with lividity, was dissipated by the inhalation of about $\frac{1}{2}$ gallon of oxygen in the course of twenty minutes. A second inhalation, five and a half hours after the first, was followed by a critical discharge from the bowels, and the woman was soon on her way to convalescence. Thompson, of Woodstock, Va.,¹⁰⁸ recommends the subcutaneous injection of strychnine sulphate, in doses of from $\frac{1}{2}$ to $\frac{1}{3}$ grain (0.0005 to 0.002 gramme), repeated according to circumstances, for the relief of the collapse that sometimes takes place in the course of enteric fever, and due neither to intestinal haemorrhage nor to perforation.

TYPHUS FEVER.

(From the ANNUAL for 1888.)

Kiernan⁹³ discusses errors of diagnosis which occurred during a local epidemic of typhus. The patients were tramps, and in the main much debilitated. In several cases the mental condition was the chief source of error. Among the conditions mistaken for typhus were delirium tremens, acute alcoholism, sunstroke, pneumonia, chronic nephritis complicated by malaria, and accompanied by delirium, subacute gastritis, cerebro-spinal sclerosis complicated by malaria and erythema, cerebro-spinal fever, malaria, phthisis and pleurisy complicated by delirium, small-pox, scarlatina, pyelitis, diarrhoea, dysentery, diphtheritic dysentery, scrofula, rheumatism and pharyngitis.

(From the ANNUAL for 1889.)

Kartulis, of Alexandria,⁶⁹ contributed a valuable paper concerning a form of fever occasionally prevalent in Egypt, and probably the same as that described by Griesinger in 1852. This fever, which has also been described under the name of typhus icterodes, was thought by Griesinger to be analogous to relapsing fever. With this disease it appears, however, to have nothing in common. There is no constant relapse. Spirochaeta are not found in the blood. It must be said, however, that cases of so-called bilious typhoid elsewhere observed, in which spirilla have been present in the blood, are probably examples of true relapsing fever with jaundice. Kartulis had the opportunity, during nine years, of treating more than one hundred and fifty cases of bilious typhoid, of which forty came to post-mortem examination. The disease, as observed by the author, presents certain points of differences from the descriptions of Griesinger, which may be set forth in parallel columns as follows:—

ACCORDING TO GRIESINGER.

A lemon-yellow icterus.
Yellow stools.
Pulse quick and regular.

ACCORDING TO KARTULIS.

Usually an orange-yellow icterus.
Usually clay-colored stools.
Pulse quick, often intermittent.

Spleen invariably enlarged and altered.	Spleen often normal.
Liver not often enlarged.	Liver invariably enlarged and tender.
Anuria absent.	Oliguria and anuria frequent.
Catarrhal or croupous inflammation of the ileum; dysentery of the large intestine.	Catarrhal inflammation of the small intestine; never croupous or dysenteric inflammation.
Croupous inflammation of the mucous membrane.	Absent.
Short in duration and cure of the disease from quinine.	No influence from quinine.

As regards the therapy, Kartulis found medication without result either in diminishing the mortality or influencing the course of the disease.

Diamantopoulos ¹¹³ states that the typhus icterodes of Smyrna is an endemic, rarely epidemic, disease of that city and its neighborhood. It is a general, acute, miasmatic, non-contagious affection,—a disease *sui generis*, not identical with yellow fever, nor the bilious typhoid of Griesinger, nor with bilious remittent fever. Its relationship to icterus gravis in many small epidemics cannot be positively affirmed. It does not, however, appear to be identical with that disease. Its etiology is obscure. Its geographical distribution in the Orient is not positively known. It probably prevails in many suburbs of Asia Minor and Egypt.

Horwitz ¹⁰⁵ published a condensed report of nineteen cases of typhus fever observed in an epidemic in the Philadelphia Hospital in 1883. Janovsky ⁵⁷ gives an elaborate study of the exanthem of typhus fever which, however, presents nothing new.

(From the ANNUAL for 1890.)

Mixed Infection—Typhus and Enteric Fevers.—Nixon ²², reports a clear case of coincident typhus and enteric fever, with death and post-mortem examination. When seen, on the date of his admission, the patient presented most of the ordinary symptoms of enteric fever: diarrhoea, epistaxis; a well-marked crop of raised rose-colored spots visible over the front of the chest and abdomen, sparsely scattered, and not marked upon the posterior aspect of trunk; enlargement of the spleen determinable by palpation; moderate distension of abdomen, but no marked tenderness or gurgling over ileo-cæcal region. The physiognomy was that of enteric fever; there was a clear eye, with absence of conjunctival congestion, and

the patient seemed bright and cheerful. The tongue was more thickly and uniformly coated than is usually seen in typhoid. There was some headache of a frontal character. The pulse was 100, the temperature 102.6° F. (39.22° C.), and the respiration 24 in the minute. The diagnosis made was enteric fever. Nixon did not see the patient till two days later, when he found profuse maculation. The spots were so thickly clustered upon the face as to resemble a case of measles, and they appeared profusely upon the trunk and parts of the extremities, especially upon the back of the wrists. The rose-spots noted two days before were still to be seen, raised, and contrasting by their color with the darker spots which surrounded them. The condition and aspect of the patient had changed considerably. He was dull and stupid; the conjunctivæ were suffused, and the tongue had become dry and brown along the centre. Diarrhœa was still persistent, and the stools were perfectly fluid in consistence, but of a dark-brown color. There was a tendency to delirium of a low, muttering character, but only existing at night. The course the case ran was markedly that of typhus,—increasing stupor, typhomania, maculæ changing into petechiæ, progressive dryness and brownness of the tongue, sordes upon the teeth, and signs of failure of circulation. On the twelfth day of the disease sudden change took place in the patient's condition, which had been fairly satisfactory. There was chill, profuse sweating, temperature 105° F. (40.55° C.), pulse 102, respiration 36. The temperature steadily rose, reaching 106.8° F. (41.55° C.) in the course of three hours, and the patient died of exhaustion. Autopsy: Dark-purple discoloration of posterior part of trunk; patchy discoloration of extremities; muscles of dark-red color; blood black and fluid; heart soft and flabby, cavities nearly empty, containing merely small quantities of discolored fibrin; lungs anaemic anteriorly, posteriorly almost airless, filled with dark blood, giving deep-purple color; liver apparently normal; spleen enlarged, weighing 15 ounces (466 grammes), and putrid. Intestines: Solitary glands of ileum considerably enlarged, some distinctly infiltrated; Peyer's patches swollen and infiltrated; enlargement progressively marked toward ileo-cæcal valve; no trace of necrosis or ulceration; in cæcum and first part of colon, spots of intense hyperæmia, giving a bright, variegated appearance to mucous membrane; in the middle of such spots, enlarged glands, some of

which were ulcerated. Nixon traced the early history of the case, arriving at the conclusion that typhus rash appeared upon the fifth day of the disease, and that death occurred on the twelfth day.

Complications.—Christie²¹³ reports an interesting case of typhus fever in a child aged 9. She was taken ill February 29th, with headache, nausea, vomiting, and pain in the abdomen. On the 6th of March a slight cough was noticed. On the 7th she was admitted to the City of Glasgow Fever Hospital, with a temperature of 98.6° F. (37° C.). Blood was then trickling from the mouth; an hour later she vomited about 2 pints of blood; complained of pain in the epigastrium, and extremities felt cold; weakness or stupor. On the 8th of March, morning temperature was 102° F. (38.88° C.). About 7 A.M. she again vomited about 2 pints of blood. In the evening the temperature was 98.2° F. (36.77° C.). Pulse scarcely perceptible; extremities cold; great restlessness,—*subsultus tendinum*. Death occurred that night. There was constipation throughout the illness. The rash of typhus was observed during life. The following is the report of the post-mortem examination. External appearances: There is a petechial rash over the body. Heart: Vessels on surface engorged; substance pale and flabby; the right side is full of blood, but the left contains little; the blood is perfectly fluid, and no clots are seen. Lungs: The posterior part of the left lung has a deep-purple color, and there are several areas of condensation in it. The right pleural cavity is obliterated by firm adhesion. A few indurated areas are felt in the right lung. Stomach: Contains some coffee-ground matter. There is no breach of surface of the mucous membrane, but there are numerous dark-colored points all over, corresponding with the orifices of the gastric glands. The small intestine, and more especially the ileum, contains a quantity of tarry-like matter, apparently altered blood. The large intestine contains a smaller quantity of the same. There is no ulceration of the Peyer's patches nor of any other part of the bowel. Liver, spleen, and kidneys are normal. Bladder distended slightly above pubis. Brain not examined. On 9th of March this girl's sister was admitted to hospital, and she proved to be a well-marked case of typhus. The father was said to be recovering from an illness at home. These facts, then, point to this being a case of typhus complicated with hæmorrhage from the mucous surfaces. Hæmatemesis is noted as an

occasional complication of typhus by Murchison, and he mentions 7 cases of this kind, with 2 recoveries.

Statistics.—Seliger⁴ reports on the epidemics of typhus at Königsberg, Prussia, in 1880, 1881, and 1882, as recorded at the city hospital. Of 672 cases, 513 (76 per cent.) occurred in males, 159 (24 per cent.) in females; 67 were vagrants, 36 prisoners, 31 paupers. Certain streets and certain houses furnished a large contingent of the cases. These houses are tenements in which the poor were herded together, often as many as four families in one little apartment. The patients did not belong to a settled population, but were of the wandering class. Most of them were "on the road, shelterless, sent from police stations or from prisons." The mortality was 76 males (14.6 per cent.) and 21 females (13.3 per cent.); total 97 (14.43 per cent.). The author explains the beginning of epidemics in winter, their increase in spring, and diminution in summer by the movement of the crowds of poor people into and out of their miserable dwellings at those seasons. Morbidity and mortality ran parallel. Attention is called to the correspondence between epidemics of typhus and of relapsing fever. That there is no antagonism between the two diseases is shown by the fact that four patients with relapsing fever contracted typhus in the hospital. Recurrence of typhus and second attacks were noted in 13 cases.

(From the ANNUAL for 1891.)

Hlava,⁵³² in 20 of 33 cases of typhus fever examined post-mortem and in 2 of 10 examined during life, found, in addition to streptococci and other micro-organisms common in secondary infection, a peculiar, well-defined bacterium to which he gives the name of *streptobacillus*. It was present only in the blood. The rounded variety resembled the *streptococcus pyogenes*; the oval, the *pneumonia bacillus* of Weichselbaum-Fraenkel. Injections into mice, rabbits, cats, and pigeons were followed by no result. Young pigs responded with acute febrile manifestations and a red exanthem. Hlava thinks it not improbable that the *streptobacillus* in question may be the cause of typhus fever, though absolute proof is wanting; and, further, that it is not impossible that the *streptobacillus* may be the carrier of a secondary infection. He

believes typhus fever to be the result of a mixed infection, like diphtheria, small-pox, scarlet fever, and typhoid, arising only by direct contact.

(From the ANNUAL for 1892.)

Thoinot ³_{Sep. 20} reported an epidemic of typhus fever, lasting from May to August, involving 80 persons, and attended with 16 deaths. Among those over 50 years old 5 out of 7 died. Investigation demonstrated that neither the water nor the air was the vehicle of infection. Transmission was invariably the result of direct contact. Of 82 indigenous cases 42 were among the members of a single family. It would appear that the germ of the disease is contained in the cutaneous secretion, and that the eruption is an important manifestation. Isolation of the sick was scrupulously observed, and feeble sublimate solutions were daily applied to the surface of the body. The rooms previously occupied by the sick were thoroughly disinfected. The clothing and linen were disinfected by immersion in a solution of mercuric chloride (1 to 1000); mattresses were burned. Zieniec, ⁵²⁰_{Sep. 4, '90} in 103 cases of typhus fever, found that there was a continual loss of weight during the febrile period. As the fever subsided weight began to return. The daily loss of weight reached 0.7 per cent., the daily gain 0.8 per cent. In patients between 16 and 30 the figures were nearly alike; in those younger the decline was slower and the ascent more rapid; in older patients the reverse was the case. The less the loss of weight during the febrile period, the greater was the gain in the crisis, and *vice versa*. The loss of weight was smaller as the temperature was higher. The loss was greater and lasted longer after the administration of antipyretics, while the weight increased more slowly and convalescence was retarded. The daily loss of weight bore an inverse proportion to the body-weight before the fever. In fatal cases the daily loss of weight was twice as large as in cases that recovered.

(From the ANNUAL for 1893).

Brannan and Cheesman ⁵⁹_{June 25} record some observations made in connection with the epidemic of typhus fever that prevailed early in the year in the city of New York. Of 185 cases treated at the

Riverside Hospital, on North Brother Island, 28 died,—a mortality of 15 per cent. Some of the deaths were due to complications, but the majority were due to the fever itself. Post-mortem examinations were made in 4 of the fatal cases, all of the organs except the brain and spinal cord being studied. The pathological appearances were pretty much the same in all of the cases, varying only in degree. There was acute degeneration of the liver and kidneys, with swelling and hyperplasia of the spleen. In 1 case an unusual accumulation of large, irregular, moderately granular cells, either free in the capillaries of the liver or clinging to their walls, was observed. Morphologic and biologic examination of the blood and viscera from 3 of the fatal cases failed to disclose the presence of micro-organisms. Morphologic and biologic examination of the blood obtained, with appropriate precautions, from the finger-tips of 6 living patients, disclosed the presence of a bacillus that proved pathogenic for rabbits, guinea-pigs, and white mice. The organism varied from 0.5 to 0.8 μ in diameter, and from 1.0 to 2.5 μ in length. It occurred singly and in pairs, and infrequently in chains of six or eight. It often appeared club-shaped, and in young cultures was ovoid. It stained readily with the ordinary aniline colors, and retained the stain of Gram's method. After several days' growth, some of the bacilli stained irregularly, presenting a mottled appearance. The organisms were immobile; spores were not found, although some of the club-shaped bacilli showed circular, unstained spots that did not color when the methods for staining spores were employed. The organism grew most abundantly upon beef blood-serum at a temperature of 37.5° C. (99.5° F.). No growth was obtained on gelatin or upon any medium at a temperature below 27° C. (80.6° F.). Development took place beneath a mica plate and in an atmosphere of hydrogen, but the growth was not so abundant as in aërobic cultures.

Lewaschew⁶⁰_{nos. 15, 24} detected in the blood of a considerable number of persons suffering with typhus fever, and cultivated from blood removed from the spleen and from the finger, a distinctive micro-organism. Cultivations upon the usual media proved



BACILLI FROM CULTURE IN TYPHUS FEVER, SHOWING IRREGULARITIES OF FORM AND STAINING.

(*Medical Record.*)

unsuccessful. By the employment of a 1-per-cent. or a 1½-per-cent. serum-agar, made with ascites fluid, it was possible to reproduce the organism. At temperatures of from 96.8° to 98.6° F. (36° to 37° C.), a characteristic growth developed in from twenty-four to forty-eight hours. No growth took place, however, at ordinary room-temperature, although the capability of subsequent development under proper conditions was preserved even after the lapse of a considerable time. A small quantity of such a culture, viewed in a drop of bouillon or of physiological salt solution, was seen to contain myriads of cocci, of from 0.2 to 0.5 μ in diameter. The organisms usually appeared singly, seldom in pairs, and rarely in small chains. Some were not in motion, while others were in active movement. In harmony with this observation, it was possible to detect a long, tenuous process in connection with many of the cocci, even without special preparation, but more distinctly after staining by the method of Loeffler. Under high powers of the microscope, corresponding organisms were found in blood obtained from the spleen and from the tip of the finger. The cilia could not be brought out by staining with the ordinary aniline colors, but they became apparent after treatment with a 2-per-cent. or a 3-per-cent. solution of osmic acid. Involution forms presented apparent excrescences. The organisms were found at all stages of the disease.

Typhus of Parrots.—Peter, of Paris, ¹⁴ in a clinical lecture, described an epidemic affection that appeared early in the year among a thousand parrots that were brought to Paris from Brazil. Most of the birds succumbed to the disease, of which the essential symptoms were cough and diarrhœa. On the voyage they had been kept between-decks, deprived of sunlight, closely crowded together, and consequently amid most unfavorable hygienic conditions. An analogous affection developed in a number of persons who had come in contact with the birds, and these persons in turn seemed to transmit the disease to other persons. Among the symptoms observed in human beings were malaise, intense pain in the back, violent dyspnœa, pain in the side, cough without expectoration, flushing of the cheeks, brilliancy of the eyes, prostration, cyanosis, diarrhœa, slight elevation of temperature; there was some impairment of the pulmonary percussion resonance, with bronchial breathing and crepitant râles. In some cases

there was epistaxis, and in some the spleen was enlarged. The elevation of temperature would continue for several days, then abruptly subside, to re-appear, however, after a few days. The opinion is expressed that the disease is one peculiar to parrots and analogous to typhus of a relapsing type. In treatment, quinine sulphate and tonics were employed; ether and caffeine were injected subcutaneously, and wet cups and blisters were applied to the chest.

Cerebro-Spinal Typhus.—Peter, of Paris,¹⁵² has reported three cases of what he designates cerebro-spinal typhus. Two were in males and one in a female. The last terminated fatally. All had been exposed to unfavorable hygienic surroundings. The principal symptoms were intense headache; vomiting, without nausea; opisthotonus; insomnia; delirium; pain in the back; constipation; herpes of the lips; moderate elevation of temperature. The abdomen was distended; the tongue was coated and tremulous; thirst was marked; the meningeal streak could be developed, being decided and persisting long; rose-spots were absent; spleen and liver were not enlarged; the pulse was dicrotic. In the fatal case a purulent meningitis was found at the post-mortem examination. In treatment, purgatives and quinine were employed, together with counter-irritation at the nape of the neck.

Ollier²²⁸ _{Sep. 15} has reported the case of a man, 29 years old, a miner by occupation, but engaged in cleaning the streets, surrounded by unfavorable hygienic conditions, and supplied with deficient food, who was suddenly seized with repeated chills, accompanied by intense occipital headache. Delirium appeared, with delusions of persecution. The bowels had not been moved for several days. The patient complained of severe pain at the nape of the neck and over the spinal column. The lower extremities were analgesic. The patellar tendon reflexes were exaggerated. The pulse was not accelerated; the temperature was moderately elevated. The area of hepatic percussion dullness was unchanged; the spleen was slightly enlarged. The urine was normal. In the course of the illness the patient had several haemoptyses, but nothing more than pulmonary congestion could be detected. Later, right hemiplegia appeared, the face subsequently participating in the palsy. Bed-sores developed, and a collection of fluid formed in the right knee-joint. For a time control of the rectal

and vesical sphincters was lost. The patient slowly improved, finally being able to get up and about. At the end of three months the hemiplegia had not entirely disappeared, but was progressively subsiding.

Little advance has been made in our knowledge of typhus fever since the classical descriptions that have made the disease so familiar from a clinical aspect. The greatest need for new facts is with regard to the pathology. If a pathognomonic morbid anatomy exist we have yet to learn its features. The disease is obviously infectious,—that is, dependent upon a specific micro-organism; although as yet this has not been isolated and had its pathogenicity demonstrated according to established rules. Different observers have severally found cocci and bacilli, respectively; but it is difficult, if not impossible, to compare these observations with one another and determine wherein they agree and wherein they disagree.

How this hypothetic germ is spread, how it gains access to its victim, and how it induces its effects are problems also awaiting solution. The well-known contagious character of the disease would seem to justify the inference that the transmission usually takes place through the intermediation of the air; and this leads to the corollary that the germ, as a rule, gains entrance to the circulation through the respiratory tract, perhaps also through the digestive tract. The symptoms are indicative of a profound intoxication, probably of biological origin. While the disease is intimately associated with filth and crowding, these are but predisposing causes,—conditions favorable to the propagation and dissemination of the exciting agent.

Typhus fever is rather uncommon at the present day, and this very fortunate state is fairly attributable to modern methods of hygiene and prophylaxis, which are largely based upon recent additions to our knowledge of infectious processes in general. The treatment is prophylactic and expectant-symptomatic. The profound depression will require sustaining measures such as quinine, strychnine, ammonia, alcohol; for nervous excitement and insomnia sedatives and hypnotics may be cautiously given; the activity of the various emunctories must be secured; and high temperature will be best combated by the cold bath. The disease is self-limited and of short duration, and well-directed therapeusis may

turn the scale at a critical period and save a life that would otherwise be lost.

(From the ANNUAL for 1894.)

Etiology.—Dubief and Bruhl, of Paris, ⁶⁷³ report the results of a bacteriological study in nine cases of typhus fever of which six proved fatal. In all they found a micro-organism in the peripheral blood and in the spleen, for which they propose the name of "diplococcus exanthematicus." The organism was also found in the nasal fossæ, the pharynx, the larynx, and the lungs.

In reporting a case of typhus fever that had escaped diagnosis, Netter ¹⁴ expressed the opinion, which was concurred in by others, that the contagion of the disease is spread by prolonged and intimate contact, and not by the atmosphere. Careful observations show, further, that the average period of incubation is twelve days.

Symptomatology.—Szwojcer ²⁹⁷ gives the results of an analysis of 109 cases of typhus fever, in the Reserve Hospital at Warsaw, between February 2 and August 18, 1889. The monthly distribution of the cases was as follows: February, 13; March, 9; April, 18; May, 23; June, 21; July, 22; August, 3. Most of the cases were prisoners. Nine were infected within the hospital,—1 physician, 1 Sister of Charity, 2 male and 3 female attendants, 1 porter, and 1 patient. The entire service of the hospital included 54 persons. In the larger number the disease was transmitted by immediate contagion, in others by the air. In one case the exposure to the poison was but momentary. The risk of infection appeared to be proportionate to the duration of exposure and the proximity to the source. Secondary cases were most common during the convalescent period of primary cases; so that, making allowance for the period of incubation, contagion must have taken place most commonly at the time of desquamation. Investigation showed that an inverse ratio existed between the number of cases of typhus and the number of cases of enteric fever. An attack of relapsing fever seemed to predispose to the occurrence of an attack of typhus. On the other hand, with the appearance of influenza the number of cases of typhus fever became smaller. Most of the cases could be traced to crowding, poor hygiene, and insufficient food. Among the whole number

of 109 cases but 7 were in females. The cases had the following distribution, according to age: between 14 and 20 years, 43 males; between 20 and 25, 29 males and 3 females; between 25 and 30, 14 males and 1 female; between 30 and 35, 7 males and 2 females; between 35 and 40, 2 males and 1 female; between 40 and 45, 2 males; between 45 and 50, 3 males; between 50 and 60, 2 males. In private practice, quite a number of cases were observed in children, one in an infant a year old, terminating fatally. As a rule, one attack appeared to confer immunity to subsequent attack. According to occupation, the largest number of cases occurred in laborers; then successively in shoemakers, locksmiths, drivers, tailors, correspondents, tradesmen, painters. Bacteriological investigation failed to yield positive results. In 4 cases in which it was possible to determine the period of incubation, this was three, four, nine, and eleven days, respectively. In the majority of cases the advent of the prodromal symptoms was gradual, and attended with repeated chills, rarely with a single, severe rigor, the temperature, meanwhile, fluctuating between 38.8° and 40.2° C. (102° and 104.4° F.). In 2 cases in which pilocarpine was tentatively administered, the temperature fell within thirty-six hours, the subjective condition at the same time improving. Subsequently, however, the condition was aggravated. For the first few days of the attack the temperature fluctuated between 38° and 39.8° C. (100.4 and 103.5° F.), rising gradually until the fourth or fifth day,—that preceding the appearance of the eruption,—when it fell slightly, reaching its maximum between the sixth and the ninth day, thereafter declining by marked remissions, the fever terminating by crisis, lysis, or pseudo-crisis. The variations between the morning and the evening temperature were considerable. The hourly variations, however, were slight. In most cases the fever was of a continued type.

The duration of the attack, exclusive of complications, varied from four to twenty-one days. Defervescence took place oftenest on the fourteenth or sixteenth day, and usually by crisis. As a rule, the frequency of the pulse corresponded with the elevation of temperature, though throughout the attack there seemed to be a tendency to acceleration of the pulse. For some days after defervescence had occurred there seemed to be a tendency to undue slowness of pulse, particularly in cases marked by crisis. Next to

the fever the exanthem was the most constant symptom observed, being absent in only two doubtful cases. Its first appearance was usually noted between the third and the fifth day, reaching its greatest intensity in the course of two or three days more and disappearing slowly at the close of the second week. As a rule, it appeared first upon the chest and abdomen, then successively upon the back, the extremities, the face, the hands and the feet, disappearing in the reverse order. It usually assumed the form of maculæ, sometimes of papules, and at other times of petechiæ. No relation was observed between the intensity of the eruption and the fatality of the cases. Sudamina appeared rather frequently at the time of and after the crisis, and seemed to be of favorable prognostic indication. Disturbances of the nervous system were among the most constant manifestations. Headache was the earliest of these and was usually frontal or temporal. Pains in the legs and in the back were present in almost all cases at the onset, increasing in intensity with the progress of the attack. In some cases there was general hyperæsthesia. In cases characterized by hyperpyrexia cerebral symptoms, such as loss of consciousness, delirium, apathy, somnolence, appeared early. In the worst cases sopor and coma appeared toward the close of the second week, with carphology, subsultus tendinum, delirium, and prostration; in others hallucinations and illusions, insomnia, incontinence of urine and faeces, singultus, hyperæsthesia, and Cheyne-Stokes breathing were observed. Simultaneously with the eruption catarrhal manifestations appeared in eyes, nose, and ears. Epistaxis was rather frequent. Bronchitis was observed in most cases. Pneumonia developed in a number. Digestive derangement was not marked. A few cases presented diarrhoea. The spleen was usually palpable on the third day, gradually increasing in size until the middle of the second week. In a small number of cases the liver was enlarged, one case being attended with icterus. The urine was examined in all cases, albuminuria being found in a considerable number, and most marked in the worst cases. Hyaline and epithelial tubecasts were also occasionally found. In uncomplicated cases convalescence set in, as a rule, with the crisis. The complications were principally of an inflammatory nature, with a tendency to suppuration. In addition to pneumonia and pleurisy, there were observed enlargement of lymph-glands, phlegmonous processes,

parotiditis, bed-sores, gangrene, and cerebral haemorrhage. Among the whole number of cases there were 10 deaths,—a mortality of 9 per cent.,—distributed as follows: between 14 and 20 years, 1; between 20 and 30, 3; between 30 and 40, 3; between 40 and 60, 3. In all of these, complications of varying severity were present. The most-marked anatomical lesions were swelling of the solitary and mesenteric glands and numerous ecchymoses in the stomach, the kidneys, and the brain. The intensity of the round-celled infiltration in various parts appeared to be the only specific characteristic. The treatment was essentially expectant, symptomatic, and hygienic-dietetic.

Lancereaux¹⁴,¹⁷ gives the results of observations upon ten cases of typhus fever. Of this number two died, the autopsy revealing only congestion at the base of the lungs; heart, liver, pancreas, kidneys, brain, and digestive tract presented no abnormality; the spleen was enlarged in the one, but unchanged in size in the other. Cultures from this organ gave negative results. All of the cases were characterized by turgescence of the face and conjunctiva and by lachrymation. The eruption occupied the trunk and the extremities, exceptionally the face; it was most marked upon the abdomen and in the groins. It appeared in the form of papules, varying in size from a pin-point to the papule of rubeola, and occasioned a marbled appearance. Some of the papules appeared dull and wine-colored; others were bright and of a rose-color, but none disappeared upon pressure. The eruption generally disappeared at the end of eight or ten days. The temperature of the patients varied from 40.6° C. (105° F.) and 38.8° C. (101.8° F.); the difference between night and morning was quite considerable. The pulse was feeble, frequent, rarely dicrotic, beating between 96 and 130. Respiration was accelerated and laborious, the voice was rough and faint, and signs of bronchitis were present. The tongue was coated and dry and sometimes fissured. The abdomen was relaxed and not painful. There was no vomiting, but there was diarrhoea, the stools being greenish in color and containing mucus. The urine was acid, scanty, turbid, and pale, and upon standing deposited mucus and urates. The proportion of urea present was diminished, varying from 11 to 20 grammes (2½ to 5 drachms). The proportion of phosphoric acid varied from 1.50 to 2.60 grammes (24 to 40½ grains); that of chlorides from 4 to 8 grammes

(1 to 2 drachms). The urine contained from 0.20 to 0.45 grammes (3 to 7 grains) of albumen in twenty-four hours. The blood, examined spectroscopically, presented no abnormality. The symptoms referable to the nervous system were profound. There were great depression of the vital forces, extreme prostration, muscular tremor, delirium or coma, insomnia, rectal and vesical incontinence, fixed eyes, contracted pupils, articular pains, and cutaneous hyperæsthesia. There were, additionally, impairment of hearing and epistaxis. Defervescence occurred on about the fifteenth day and was followed by convalescence.

De Brun, of Beyrouth, ¹⁴_{Aug. 30} describes the nervous manifestations observed in an epidemic of typhus fever. The most noteworthy were headache, vertigo, insomnia, rachialgia, gastralgia, cutaneous hyperæsthesia, general soreness, prostration, tremor, subsultus tendinum, impairment of intellect, loss of memory, delirium, and various psychic manifestations. Combemale ⁸¹_{July 15} reports four cases of grave type in which on the fourteenth, twelfth, thirteenth, and eleventh days, respectively, there appeared upon the alæ nasi, the pavilion of the ear or the forehead, in the nature of a critical manifestation, a number of whitish, pulverulent efflorescences, which, upon being rubbed with the finger, re-appeared in a few hours, and which, upon examination, were found to be constituted of degenerated epithelial cells and fatty matter. Two of the cases terminated fatally, one on the day of the appearance of the eruption, the other a day later. In the other two recovery ensued, the appearance of the efflorescences being shortly followed by defervescence. In the fatal cases the significant lesion found after death was acute nephritis. Combemale ³⁶³_{July 29} has also reported two cases in which temperatures of 33.8° C. (92.8° F.) and 33.2° C. (92° F.), respectively, were observed. The diagnosis was indubitable. Two alternatives were offered in explanation: (1) that the low temperature was the expression of a depressant action upon the thermogenic centres of the poisons generated in the course of the disease, and (2) that it was a manifestation of uræmia dependent upon parenchymatous degeneration of the kidneys. One of the cases terminated fatally, and post-mortem examination disclosed the existence of parenchymatous renal changes.

Diagnosis.—According to Netter, ¹⁴_{Apr. 22} the following points should be considered in the diagnosis of typhus fever: 1. The

disease is most common in winter and spring. 2. The average age is more advanced than in enteric fever. 3. Excluding those in attendance upon the sick, typhus attacks almost exclusively those without domicile. 4. Contagion is exceedingly rare in enteric fever. 5. Physicians, nurses, and assistants usually furnish a full quota of typhus victims. 6. Recurrence of enteric fever is uncommon. 7. Typhus is characterized by the shortness of the time in which death occurs or convalescence sets in; death or recovery takes place later in case of enteric fever. 8. The high mortality is an element in the diagnosis.

Treatment.—Combemale and Gaudier¹⁴ report 18 cases of typhus fever treated with the cold bath. But two baths could be given daily, one at 9 A.M., the other at 4 P.M. The temperature of the water was 18° C. (64.4° F.), sometimes being lowered to 15° C. (59° F.), the patient being introduced if his axillary temperature exceeded 39° C. (102° F.). The maximum duration of the bath was ten minutes. Three hundred baths were given without a single accident. In cases of moderate intensity defervescence set in on the seventh day; in grave cases on the fifteenth day. Eight of the cases terminated fatally,—44 per cent.; but, of these, only 3 had been bathed before the seventh day; in the others the baths were begun on the eighth, ninth, eleventh, and thirteenth days, respectively. Four died before the end of the first week; the others on the seventeenth, eighteenth, twenty-first, and twenty-second days, respectively; some of myocarditis, others of acute bed-sores. It is concluded that cold baths favorably influence the course of typhus fever, lowering the temperature and relieving the typhoid condition and the nervous symptoms. The baths should not, however, constitute the only therapeutic measure; tonics, alcohol, and quinine should also be generously administered. In case of cardiac asthenia injections of caffeine should be practiced. Alimentary diuretics, such as milk, also play a prominent part in the treatment of typhus.

Scheschminzew⁵⁷¹ has had good results from the internal administration of creolin in doses of $\frac{1}{4}$ grain (0.045 gramme) in distilled water, from four to six times daily. Vance, of Sonoma, Cal.,¹⁹⁹ recommends the application of leeches upon the temples or upon the ears during the fierce delirium or intense cephalgia in cases of typhus fever in the young and robust.

INFLUENZA.

(From the ANNUAL for 1891.)

The outbreak of 1889-90, the first pandemic since that of 1847-48, was noted in the journals of the latter part of 1888. As pointed out in the last ANNUAL, numerous outbreaks of febrile disorders, not easily classified, had appeared in various sections during the latter part of 1889. Many of these, doubtless, were instances of epidemic influenza, the true nature of which was not at first recognized. Few medical men of to-day knew the disease in its aggravated form. It is true that from time to time cases were observed that could not be excluded from the category of catarrhal fever, but it is not quite certain that these were instances of true influenza; and it is very probable that during the prevalence of the pandemic many conditions were diagnosed as influenza that were something else. An infallible test or a pathognomonic symptom of the disease was wanting. The results of bacteriological examination were not concordant and it was not clearly shown what particular organism was the responsible etiological factor. Its infectious nature was self-evident. Its pandemic character, its wide-spread distribution, the rapidity of its spread, the virulence of its action, the severity of its sequelæ, and the fatality of its results all pointed to this. There was, besides, much evidence that the affection is contagious. Looked upon as a comparatively mild disease and as doing harm by attacking large numbers of people, especially the sick, the weak, and the old, influenza proved itself to be an intensely virulent disease, attacking all classes and often destroying life when it did not permanently maim.

The disease has been popularly described under the designation *la grippe*. Like most of its great predecessors, it came from the East. Its prevalence was first recognized in Bokhara ^{Jan. 20} in May, 1889. Europeans were first seized, after that the natives, and by July half the population of Bokhara had succumbed to the epidemic, which continued until August. It advanced from Bokhara by two routes,—eastward and westward. It showed itself by the 1st of October at Viatka, and toward the 11th of October at St. Petersburg. On the other hand, on the 16th of October it prevailed at Tomsk and throughout Siberia. From St. Petersburg it spread to Moscow. It appeared in Berlin ^{Nov. 17} in November; in Hamburg about the 1st of December; in Leipzig about December the 10th;

in Cologne, December the 1st; in Paris, November the 26th; in Wurtzburg and Munich it began about the middle of December; in Vienna, December 12th; Pesth, December 16th; Belgrade, December 16th; Bucharest and Sophia, December 24th. Proceeding from Paris, it began in Brussels December 12th; in Antwerp, December 16th. The first cases in London occurred at the end of December; in Madrid, December 14th; at Malaga, December 12th; Lisbon, December 21st; Alexandria, December 25th; in Algeria, December 31st; Capetown, the first week in January.

Heyfelder affirms that the picture of the disease at Bokhara, as well as that at St. Petersburg and Moscow, was identical with that seen in an epidemic of dengue which prevailed the previous year in Greece and at Constantinople. ³ _{Jan. 29}

Isolated cases showed themselves in New York and Philadelphia about the middle of December, and the disease became epidemic on the Atlantic sea-board during the last week in December. Thence it spread rapidly throughout the United States. It prevailed in Mexico in April, and appeared in the same month almost simultaneously in New Zealand, ⁵⁵⁷ _{July} Australia, and in Arequipa, high up in the Andes of Peru. ²⁸⁵ _{Sept. 16}

This great outbreak, like many of the previous pandemics, proceeded from St. Petersburg, at first, in a southwesterly direction; and for this reason was occasionally spoken of as the Russian influenza. Its course from Berlin was very irregular, but obviously along the lines of travel. The time required for it to traverse long distances and to cross the Atlantic corresponded closely with that consumed in the ordinary methods of travel and communication. Its appearance in large cities was usually heralded by the occurrence of scattered cases at different points, which preceded the general outbreak by from twenty-four to thirty-six hours. The spread of the epidemic, under such circumstances, was always very rapid, the greater part of the community being affected in the course of a few days. The duration of the local epidemics was somewhat modified by the density and extent of the population, but did not, in large cities, often extend beyond four to six weeks. Its subsidence was usually, like its onset, rapid, the occurrence of new cases frequently ceasing within two or three days of the very general prevalence of the disease. The effects of the malady, however, showed themselves in a remarkable depression

of the general health. Not only during the presence of epidemic influenza was the prevalence and severity of other acute diseases largely increased and the mortality from all causes augmented, but this condition of affairs continued for several weeks after the subsidence of the epidemic.

During the year 1890, ordinary cases of influenza, occurring sporadically or in local epidemics, have been more severe than usual, not infrequently manifesting the nervous phenomena characteristic of grippe. So noticeable has been this intensification of the symptoms of a familiar and usually trifling malady, that it has on many occasions given rise to the opinion that the now-dreaded grippe had broken out again. It is probable that this has not been the case, but that the conditions described are to be referred to an increased susceptibility to the influences which cause catarrhal fever on the part of many individuals, and which is the consequence of the epidemic of last winter. A less tenable explanation ascribes the intensification of ordinary influenzas to something of the original cause of the pandemic yet lingering in those localities where its main virulence was quickly spent. The wide prevalence of influenza afforded ample opportunities for the re-study of the disease.

Epidemiology and Etiology.—The epidemiology of influenza has been fully discussed in the literature of the past year. The study of the meteorological conditions under which it prevailed has strengthened the theory that humidity of the atmosphere has much to do with its development. Colleville⁵⁷⁷ attributes the frequency of pulmonary complications in the military hospital at Reims, among the soldiers from the artillery casern, to the constant dampness of the latter. Maurel¹⁶⁴ _{Jan. 2} emphasizes the preference of influenza for low countries and the valleys of large rivers. The claim that it avoids high altitudes on account of the low temperature is not in accordance with the first report of its appearance in the heart of Russia, in the middle of winter. The original centres of its development were the borders of the Indian Ocean and the Caribbean Sea, but the extension of these centres has become more and more advanced, until the disease has invaded the temperate zones. In the epidemics of 1784 and 1867, Cadiz was the port of entrance; since that time, Beyrouth and Constantinople. Debrun⁹² _{Jan.} asserts that its propagation is not effected by proximity

of localities, but by facility of communication. Its manner of advancing step by step was observed in the spread of influenza from the Piræus to Athens. Ucke,²¹ maintains that the atmospheric conditions bear an important relation to the spread of the infecting agent; the micro-organisms are carried high up by the warm currents and are precipitated again to the stratum in which they are effective by the eddies which the cold currents produce. Kowalski⁸ describes influenza as a specific disease occurring under conditions constantly the same, due to atmospheric influences and complicated by the pathogenic germs at hand. Leyden⁴¹ inclines to the opinion that the infection is due to a miasmatic chemical material derived from the atmosphere. English and American writers seem to consider the infection of miasmatic origin, dependent on meteorological conditions, although Greenley²²⁴ asserts that influenza is independent of hygrometric, thermometric, and barometric changes.

Influenza is not essentially a winter disease, although it usually occurs in winter, but during or after warm winter weather consequent upon cyclonic disturbances in the upper air. Its development cannot be attributed to heavy rain-falls in the autumn or early winter, as after such phenomena at other times in the year it is not likely to occur (Greenley,²²⁴ Mitchel and Buchan²).

When we look into the subject of the transmissibility of influenza we meet with two opposing theories,—that supporting the miasmatic origin and that the bacterial, with spread by contagion. These theories cannot be reconciled until bacteriological investigations yield more definite results. The former is advocated by Osler,⁵ Leyden,⁴¹ Otremba,²²³ Ucke,²¹ Kowalski,⁸ Fürbringer and Tibbles, the latter concluding² that influenza is developed in media external to the body and is spread by atmospheric influences.

Colleville,⁵⁷⁷ who advocates the theory of contagion, admits that the following facts noted by him in the military hospital at Reims are not in accord with his theory: first, during the treatment of 300 influenza cases among 500 other cases, only 20 of the latter were affected, and of the 50 nurses in attendance only 5; second, the time at which the attack occurred after exposure was disproportionate to the length of time of contact, or to the time elapsing after contact. In support of his theory, he cites an instance

in which a convalescent from scarlatina was attacked while being attended by a nurse who had just recovered from influenza, she alone having access to the patient. He concludes that influenza is contagious, depending on a bacterium developed outside of the body, and accounts for the delay often observed in the transference of the disease to a decrease in the virulence of the infecting principle after its first sojourn in the human body. He further asserts his belief that the bacterium selects the primary air-passages as the point of localization. Otremba²²³ believes that influenza is neither contagious nor imported from other localities than those in which it appears, but that the microbe of influenza is identical with that of simple coryza, which has attained its "summum potentiae" through favorable telluric or climatic conditions, such as those of temperature or humidity of the atmosphere. For this reason he recommends the term "epidemic catarrhal fever," as denoting the most frequent and predominating manifestations. Tibbles,² supporting the theory of miasmatic infection, accounts for the absence of influenza in certain localities and the irregularity of its spread, not by the want of communication between infected and non-infected communities, but by a deficiency in the number of the germs or some change in the atmospheric conditions.

The following instance, reported by Proust,³ is strong evidence of contagiousness: The packet "St. Germain" received at Santander a passenger from Madrid, where influenza was prevalent; the day after his embarkation he was seized with influenza. The ship's doctor was taken sick on the fourth day, and in a few days the outbreak had become general; 154 passengers out of 436 were affected and 47 of the crew, making a total of 201. Antony¹⁰⁰ cites this as illustrating the possibility of the universal spread by means of contagion, established by the fact of the disease here affecting one person after another as the chances for contact occurred, and of its breaking out at sea, where its appearance, according to the anticontagionists, was to be accounted for only by a universal infection depending on meteorological conditions. He adduces two more arguments in favor of the theory of contagion, namely, that the anomalies of contagiousness are to be explained by what is so often observed in measles,—that is, the difference in individual receptivity,—and by the fact that influenza is often present long before it is recognized.

Lotz²¹⁴ holds that either the infecting element has spread from a primary source, as St. Petersburg, or that such an element was in existence everywhere, and the cause which called it into life first arose at St. Petersburg; and that the disease spread either through the air or by transmission from individual to individual, possibly indirectly, by means of utensils. With Osler and others he lays great stress on the short period of incubation. Straub¹³³ is an outspoken contagionist; he has observed that those were first attacked who came most in contact with outlying localities, and from this class the disease spread through a community. Pribram⁸⁸ proves that 29 cases out of 34 were due to contagion. As already stated, the opinion of English writers seems to be in favor of the theory that influenza is dependent on a germ of miasmatic origin, the character of this germ being unknown; that the disease is severely infectious, but mildly contagious; that it spreads by atmospheric influences by development in external media; that its development outside of the body is the cause of its wide and rapid spread. It is of great importance to determine the length of the period of incubation as bearing on the question of epidemiology. A similar catarrhal affection was prevalent in London among horses before its more pronounced outbreak, as well in the preceding epidemics as in this. Kirn⁵⁴¹ quotes some interesting observations made in the district prison at Freiburg: Of 406 prisoners 144 (35 per cent.) were stricken; of those in solitary confinement, 30 per cent.; of those in the common wards, 50 per cent.; of those in communication with the outer world, 70 per cent. The restriction of the outbreak to different corridors shows that it was not due to a miasmatic influence. Combe¹⁹⁷ speaks, on the ground of his observations among the pupils of the primary school at Lausanne, against the contagion of influenza: of 3411, 1840 were affected. The age of the children had no influence on the predisposition. The girls were less frequently affected than the boys (which is different from what occurs in purely contagious diseases,—measles, scarlatina, varicella, rötheln). This and different other observations have induced the writer to conclude that the transmission of the disease from person to person is the exception, and that the dissemination of the disease is accomplished through the atmosphere. The boys were affected in greater numbers because they were more in the open air. In

regard to the universality of the outbreak in certain communities, it is to be observed that it may have existed in a modified form before it became general; therefore the rapidity of its spread was merely apparent. Kowalski⁸ observed that the atmospheric conditions during the epidemic, studied from a bacteriological stand-point, were markedly unfavorable to the propagation of germs. He further writes: "The fact, also, should not be ignored that the earth's surface at the time of the appearance of influenza, at least in the East and in middle Europe, was covered with a thick layer of snow, and dissemination of the germ with the dust must be considered to be virtually excluded. According to my repeated bacteriological examinations of the atmosphere, which I had begun four years previously, and which, during the influenza in the first half of the month of December, 1889, I repeated, I can, with confidence, assert that a light rain-fall, lasting but an hour, is sufficient to purify the air completely of bacteria, and that after a snow-fall of a half hour the air for a considerable time is free from bacteria. The extension of influenza was independent of the direction of the wind-currents, and yet was dependent on the atmosphere, since purely contagious dissemination must be acknowledged to be untenable and to be confuted by innumerable observations; and when I review the whole subject I must confess that I have not succeeded in finding, from a bacteriological stand-point alone, a sufficient explanation for the etiology of influenza."

Bäumler³⁴ believes that influenza is a purely contagious disease of very intense infectiveness and with a very short period of incubation.

The mass of evidence leaves us very much in doubt, and it seems as if the question depended for solution upon data vitiated by the manner in which different observers have interpreted facts which do not warrant any very definite conclusion. Speaking generally, the contagionists cannot prove that the facts upon which they rely exclude the possibility of infection from miasmatic influences of either a chemical or a bacterial nature, except in one or two instances (notably that cited by Kirn,⁵⁴¹ where he states that the outbreak in the prison at Freiburg was confined distinctly to certain corridors of the prison). The question is, whether one such instance, reliably reported, forms a sufficient basis for the theory of contagiousness.

Bacteriology. — Prudden⁵⁹ made thorough bacteriological studies of material derived from 7 unmistakable cases of simple influenza, presenting various phases of symptoms. In 3 of the cases there was bronchitis, with considerable muco-purulent expectoration. In the remainder there was moderate coryza, in 2 with slight discharge. In all but 1 of the cases the discharge was obtained in the early stage of the disease; in that one on the fifth day. Cultures were made upon agar and agar-glycerin plates, at the temperature of the body. Several plates were made in each case and all of the more abundant bacterial species which developed were isolated and subjected to further examination and experiment.

In 2 of the 3 cases of influenza with bronchitis there were very large numbers of the streptococcus pyogenes; this was the prevailing species. All the rest were scattering forms, only found in the sputum in bronchitis, some of them the ordinary aerial bacteria. In the other case of bronchitis, there were large numbers of the diplococcus pneumoniae of Fraenkel and Weichselbaum, associated with the staphylococcus pyogenes aureus and several scattering forms.

In the secretion in the nose of 1 of the cases with coryza, the staphylococcus pyogenes aureus was found in small numbers. The other forms, which were not numerous, were scattering. While these cultures were being made, the scanty sputum from a case of moderately severe simple pharyngitis was studied in the same way; and in this the diplococcus of pneumonia was isolated in very large numbers, together with a considerable number of scattering forms.

The same observer examined, by culture methods, the sputum from 5 cases of prolonged and irregular pneumonia immediately following the attack of influenza; also material from the irregularly hepatized lung from a fatal case of pneumonia following influenza. Cultures of the sputum of 4 of the first 5 cases showed the diplococcus pneumoniae in large numbers, together with the staphylococcus pyogenes aureus in considerable numbers, along with scattering forms. From the lung of the fatal case, large numbers of the diplococcus were cultivated, and nothing else. It was a pure culture.

In summing up the whole series of examinations, the author emphasizes the fact that no special new forms of bacteria were

discovered which there is any reason to believe have anything to do with causing the disease. He regards as very grave the pneumoniæ following influenza, which, although apt to be irregular in course and atypical in morphology, are due to the same bacterial agency as is the ordinary acute lobar pneumonia. To what extent this may be complicated by the frequent presence of the pyogenic bacteria is a question which must be settled by further studies on the general relationship of this organism to inflammations of the respiratory organs and of other mucous membranes.

Prudden regards influenza, viewed from the stand-point of bacteriological investigation, as a condition predisposing to atypical pneumonia,—the conclusion already reached by the clinical method of observation. It is in many respects similar to the predisposition which measles furnishes, in children, to the incursions of various forms of pulmonary inflammation.

Marmorek⁸ reports the results of examination of the bronchial secretion of 8 cases, 7 of which were pure influenza and 1 influenza complicated with catarrhal pneumonia. On microscopical examination there were found, as the prevailing bacterial form, round, ovoid, short, rod-shaped, lancet-formed varieties in rows of two, less frequently of four and eight, inclosed in a thick, transparent capsule, and capable of being colored by Gram's method. These, in their microscopical appearance, coincided fully with the Fraenkel-Weichselbaum pneumococcus. No other microbe forms were found as constant associates of the form mentioned. In another series of cases the diplococcus was wanting in six instances, but the examination was made in all these cases in the last ten days of the sickness, and after thirteen days had elapsed since the beginning of the attack. He mentions the characteristics which distinguish the Fraenkel-Weichselbaum pneumococcus from the streptococcus pyogenes: the developed form in the body, as the capsulated lancet or short, rod-like forms; the imperfect development on agar at the body-temperature in the form of indistinct cloudiness of the culture medium; the relatively less marked development in broth; the appearance in both culture media of relatively short, slightly tortuous chains; the low viability, and the inability to increase on gelatin at the temperature of the room.

The writer throws doubt upon the bacterial researches of

Ribbert, who claims⁶⁹ to have found in influenza the ordinary pyogenic coccias the only constant bacterial form, while the diplococcus was absent, since the agar cultures of the latter and those of the ordinary streptococcus are scarcely to be differentiated the one from the other, both as regards the form of the colony and the appearance of the individual. The only manner in which this differentiation can be made is by the cultivation of colonies in gelatin, and this Ribbert had failed to do. Marmorek, in reference to the bacterium discovered by his own researches, believes there are two possibilities, namely, that we have either to do with a coccus very much allied to the pneumococcus of Fraenkel-Weichselbaum, but not the same, or that there exists an anomalous variety of the Fraenkel coccus, with less virulence and increased capability of thriving outside the body, namely, upon the mucous membrane of the respiratory tract. In support of this latter opinion he cites the frequent appearance of otitis media at the time of the influenza epidemic, as well as, although less frequently, of croupous pneumonia in the course of influenza. He summarizes the results of his investigation as follows: "We have been able to find in the bronchial secretion of cases with outspoken localization in the lungs no other micro-organism demonstrable by our methods of coloring and culture which is constantly present."

Weichselbaum,⁶⁹ in his investigation of a series of 18 cases, made up of 15 cases of simple, uncomplicated influenza, 1 of influenza complicated with catarrhal pneumonia, 2 of influenza with lobar pneumonia developed later, reports the same disproportion between the number of the diplococcus pneumoniae and that of the streptococcus pyogenes and the staphylococcus pyogenes aureus, in favor of the first. He found, in 10 autopsies of cases of simple influenza and influenza with complications, the presence of inflammation of the frontal sinuses and antra of Highmore. He demonstrated the diplococcus pneumoniae in this pus by the microscope and by cultures. Levy,⁷⁰ whose investigations were conducted at the Strasburg Clinic, examined the secretion in 7 cases of otitis media. He found the diplococcus pneumoniae of Fraenkel-Weichselbaum in pure culture in 6 cases and in 1 case associated with staphylococcus pyogenes albus.

Babes⁵⁰ and Kowalski⁸ announce new forms which have heretofore not been described. The former describes a form

obtained from agar-agar cultivations and from cultures on nutrient gelatin and potatoes. These colonies consist of extremely small, constricted bacteria, sometimes forming short chains, sometimes drawn out into fine rods, sometimes round or pear-shaped. At their extremities vesicular swellings are found here and there. These bacteria readily produce lung affections. They flourish *in vacuo*. Babes names this form No. 1. From the cultivations derived from the secretions from the nose and frontal sinuses he obtains form No. 2. The bacteria of this form are deeply stained by the aniline stains and by Gram's method. They are constricted and somewhat pointed, with one convex and one straight side, often provided in the middle with an unstained stripe. They form groups of two, with the straight sides facing each other. In the case of mice and guinea-pigs they cause fatal pneumonia, with localization of the bacilli in the vessels of the alveolar septa. He suggests that these forms may be a pathological element in influenza.

Kowalski finds, besides the diplococcus and the streptococcus and staphylococcus, three forms not yet described: the first, bacilli similar to the bacilli in typhoid fever, showing plainly molecular movement, tinged lightly with aniline stains and developing at the temperature of the room; second, a bacillus which forms, in gelatin, snow-white, opaque colonies, thriving at the temperature of the room. He believes that these two forms have no causal relation to influenza. Since the culture of the third form in macroscopical appearance suggests the appearance of a firm jelly, he has given it the name, "jelly streptococcus." He considers that if this form had been found in every case of influenza it would have had a claim to be considered the cause of the disease, since the biological peculiarities of this form, studied by means of inoculations, go far toward explaining both the clinical picture of influenza and the epidemic outbreak.

Laveran and others have found the streptococcus pyogenes the predominant form.¹⁴ Dowd⁵⁹ summarizes as follows: "If we review the results, we find that both the diplococcus pneumoniæ and the streptococcus pyogenes were found in the lungs, in the sputum and other secretions, and in various exudations, and each was many times found in pure culture; *e.g.*, in the pus in otitis media Finkler finds pure

growths of the other. Both of these forms are found in the mouth and air-passages in health or in conditions of slight disease, and they seem ready to set up their action when inflammation provides a suitable medium for growth. The general belief is that they have not been the cause of influenza, but that they have developed as the influenza has provided them with a suitable condition for growth, and that their development may have caused some of the complications."

As regards the blood, Klebs⁵⁰ found a number of small bodies of highly refractive power and active movements, similar to the bodies found in pernicious anaemia, although in the latter they are never present in such numbers. Another distinction between the blood of influenza and that of pernicious anaemia is the absence of microcytes in the former. In the blood of a patient who died of influenza he found other oval bodies, which differed from the monads first described by the slowness of their movements; stained by Ehrlich's solution of methyl blue, they displayed, after coming to rest, flagellæ. He suggests that in all diseases in which the fever is due to haematozoa belonging to the protozoa we have a periodic type of fever, while the fever in which the schizomycetes are present is of the continued type. The bodies described by Klebs were, for the most part, found in the red corpuscles.

Kollman⁴¹ is also among the few who have found anything significant in the blood. He describes, in addition to the monads found by Klebs, rod-shaped bodies with protuberant ends. He considers, however, that they may not be abnormal, as he has found them in the blood of healthy individuals. He was not able to detect the flagellate bodies in the red corpuscles. Leyden, Marmorek, Weichselbaum, and Laveran report negative results in examination of the blood.

Symptomatology.—The symptoms and complications of the disease during the pandemic were Protean in their character. The disease sought out the weak point in the individual and expended its virulence at this *locus minoris resistentiae*. There were three ways in which its influence seemed to be exerted. In some, latent disorders were excited to renewed activity; or, secondly, morbid states were precipitated in those predisposed; while in a third group, the complication directly reflected the impress of the disease.

The symptoms were far from being exclusively catarrhal. It can

scarcely be said that they even predominated. Not a system of the organism escaped invasion. A classification into gastric, pulmonary, and nervous types is not far-reaching enough. Duflocq⁹² pp. 88 to 108 divides the varieties of influenza seen at Paris into four types: nervous, thoracic, cardiac, gastro-intestinal. The nervous type was characterized by headache, lumbago, pains in the limbs, fever, prostration. The onset might be sudden. The pain in the back was suggestive of variola. In the thoracic type, coryza, laryngitis, bronchitis, and pneumonia were the prominent manifestations. The cardiac type was marked by cardiac weakness, oppression, and distress, approaching the intensity of the symptoms of angina pectoris. The gastro-intestinal type was attended with nausea, vomiting, and diarrhoea.

Bäumler,⁶⁹ at the Ninth Congress for Internal Medicine, at Vienna, held that the profound constitutional involvement pointed to grave changes in the blood, as evidenced by the subsequent pallor and the so-called urobilin icterus, as well as by the enlargement of the spleen. Microscopical examination of the blood revealed no changes that could be considered characteristic. Such changes as did occur, however, together with the vascular dilatation in the stage of pyrexia, prepared the way for complications. The nervous symptoms must be considered manifestations of some toxic action, as must also early damage to the heart, which in its turn may give rise to further complications, such as gangrene of the lower extremities.

Axel Ulrik, corresponding editor, Copenhagen, states that reports from 511 Danish physicians¹¹²⁰ disclose that, of 528 deaths attributed to influenza, 46 resulted from the uncomplicated disease, 39 from senility, 49 from phthisis, 273 from croupous and bronchopneumonia, 81 from other affections of the lungs, 5 from pleurisy, and 2 from empyema. Thirty-three deaths were noted from cerebral affections in the course of influenza.

Da Costa,⁹ in a clinical lecture, called attention to the prevalence of nervous symptoms as one of the most singular features of the epidemic. They comprised violent headache, severe pains all over the body, pain along the spine, and also, in a number of cases, by hyperesthesia of the entire surface. In one case, delirium with headache was observed. In the case of a refined lady, the patient swore at the doctor. The mind may be lost from

the violence of the headache and delirium. He had seen a case with convulsions of the upper extremities, in which cerebro-spinal fever was excluded. In another, paralysis of the lower extremities followed influenza. In many of the so-called cases of pneumonia the lungs are deeply congested, concurrently with great debility. The process does not seem to be one of true pneumonic exudation. The dullness is not absolute. The high-pitched bronchial breathing of croupous pneumonia is found in only a few instances. There is no consolidation.

Complications.—Leyden⁴ states that the course of the *pneumonia* was seldom that of the typical disease, that it rarely set in with a decided rigor, and that the inflammatory symptoms, notably the pain in the side, were but little marked. The local process, likewise, was not characteristic. Local signs were not detectable before the third or fourth day. Crepitation would be heard over a considerable area, soon disappearing and becoming evident at another. Not often did the process reach hepatization, with definite dullness. Typical rusty sputum was seldom observed. Often there was no expectoration, or it was catarrhal or sanguineous for a day or two. Crises were rare. The course of the inflammation was milder, dyspnoea and rapid infiltration being wanting.

Sokolowski⁵⁷ found malignancy characteristic of the pneumonia complicating influenza, 7 of his 14 cases terminating fatally; in 3 cases death resulted from acute purulent meningitis; in 3 cases the pneumonia was central, without distinct physical signs; in 4 fatal cases an entire lung was infiltrated, and in 1 of these the remaining lung contained areas of lobular pneumonia; in another the hepatized lung contained collections of pus, and in 2 pleuritic and pericarditic effusions also existed; 1 case presented a pneumonia migrans.

Kahler, at a meeting of the Society of Physicians of Vienna,⁸ observed that the grave pulmonary and pleural complications of influenza pursued three courses. The most important, on account of its severity and malignancy, was that of the formation of abscesses in the lung and purulent pleurisy, in combination or occurring independently. An illustrative case presented, on post-mortem examination, abscesses in the lower lobe of the left lung, circumscribed purulent infiltration of the pleura, purulent pleurisy

and diffuse purulent bronchitis, without pneumonia. In another fatal case, with purulent infiltration of the pleura and purulent pleurisy, the abscesses were seated in the midst of hepaticized pulmonary structure. In the second variety, the lobular pneumonia or pleuro-pneumonia was insidious in character, the patient passing through an attack of influenza with bronchitis, and, at the end of convalescence, presenting the signs of consolidation. The third class included cases of grave bronchitis, in some instances giving rise to catarrhal pneumonia.

Nothnagel,⁵⁷ _{Jan. 12} discussing before the Society of Physicians of Vienna the connection between croupous pneumonia and influenza, believed that there is no direct relation of one to the other. If a patient with influenza have also croupous pneumonia, the association is accidental. The invasion of the one but prepares the way for that of the other. Pulmonary catarrhs are common in cases of influenza, and experience teaches that inflammation readily occurs in a lung already the seat of catarrh.

As regards the *upper respiratory tract*, Lublinski⁴¹ _{June 22} reported to the Laryngological Society of Berlin that he had observed, in influenza, haemorrhagic rhinitis, acute and phlegmonous angina, croupous deposits on the tonsils and on the posterior wall of the pharynx. Acute laryngitis presented a peculiar appearance. At the onset the vocal bands were shining, swollen, reddened. Later, white spots appeared, resembling superficial necrosis. There were 2 cases of laryngitis subglottica. As *sequelæ* he saw 4 cases of laryngitis haemorrhagica and 2 of laryngitis subglottica.

Mispelbaum³¹⁴ _{Nov. 11} discusses the *psychoses* following influenza. He saw 10 cases at the clinic at Bonn. The mental disorder set in during convalescence, and was preceded by a sense of fatigue and obstinate insomnia. It was initiated by acute delirium, which in all cases but 2 passed into melancholia of variable duration. The prognosis is favorable. Mispelbaum is in accord with Kraepelin in the opinion that influenza alone scarcely suffices to give rise to mental disturbance in a patient normally constituted, and that other injurious influences are concurrently responsible. More than half of the 10 cases reported by Mispelbaum possessed a neuropathic heredity, and 2 "nervous irritability." In the line of treatment, convalescence should be carefully watched and signs of mental aberration combated with stimulants and restoratives.

Mispelbaum reports, besides, 3 cases of tedious intercostal neuralgia and 2 of obstinate supra-orbital neuralgia. In 2 cases he saw persistent insomnia.

Van Deventer⁸⁸ records the results of observations upon influenza in the Buiten-Hospital of Amsterdam. A large number of patients in the nervous wards were attacked. In the majority of cases no bad results followed. In many cases the influenza was latent in character. Alcoholism played a conspicuous part in the cases of so-called influenza psychoses. Delirium tremens was observed in 10 cases, 3 of which terminated fatally. Hysterical manifestations were present in some cases. In a number, an epileptic seizure inaugurated the attack of influenza.

The influence, favorable or unfavorable, of influenza upon existing disease of the nervous system is apparent rather than real. Delirium was rare in uncomplicated cases. The acceptance of an encephalic form of influenza is not warranted.

Helweg⁸⁹ has given a most interesting account of an epidemic of influenza in an insane-asylum. On post-mortem examination of 4 cases, he found hyperæmia of the diploë, of the membranes, and of the cerebral structure. In ordinary cases the mental symptoms were aggravated. Acute maniacal delirium developed in patients previously presenting quiet and chronic forms of mental disease. In 2 cases, originally of puerperal psychoses, influenza, associated with pneumonia, was followed by improvement in the mental condition. Both patients were dismissed, a certain dullness of intellect, however, persisting. Helweg ascribes the improvement to the increased supply of blood to the brain, as a result of the hyperæmia.

Paine¹³⁹ reports 7 cases of insanity, in which recovery, absolute or relative, followed attacks of influenza. On the other hand, he observed 4 cases, in which the development of insanity was ascribed to influenza. Of these, 2 recovered; 1, with acute mania, was thought curable; the fourth was complicated by paraplegia, but recovery was thought possible.

Kern⁹⁴ holds that influenza may be the sole etiological element in the development of a psychosis, or it may merely act as an exciting factor in disturbing the equilibrium of a nervous system already deranged or in intensifying a latent mental disorder. To cases of the former variety he would apply the name of typical in-

fluenza psychoses. He relates such a case in a laborer of 40, of low intelligence, who was seized, at the height of an attack of influenza, with acute mania which lasted for twenty-four days and ultimately terminated in recovery.

Pick, of Prague, ⁷⁵ _{Feb. 15} finds in the analogy of influenza to other infectious diseases, in the occurrence of nervous and cerebral disorders in the course of the affection, sufficient explanation of the development of psychoses in predisposed individuals, and reports a case in a girl of 20, in whom a condition of acute mania continued for ten days, ultimately terminating in recovery. He quotes Crichton-Browne as having, in 1874, reported the occurrence of acute dementia in a chlorotic girl after an attack of influenza.

Blocq, ³¹ _{June}, from a study of the relation between influenza and derangements of the nervous system, presents the following conclusions: 1. Certain nervous affections are really grippal, in the sense that they may be considered special localization of influenza upon the nervous system. 2. Another group depends equally upon the grippe, but secondarily. It is not the grippe itself, but the secondary infections which have determined the neuropathies. 3. A third category includes neuropathies in the development of which influenza has only been an exciting factor, determining a recurrence of a previous but recovered-from condition, or bringing about a new condition in an individual predisposed.

Holst ⁴ _{July} reports 2 cases in which psychoses developed subsequently to influenza. The one occurred in a man of 17, without hereditary predisposition, and assumed the form of transient hallucinatory mania, from which recovery took place in five days. The second, which had a fatal issue, was in a girl of 20, with a neuro-pathic history, who presented delirium. Thrombi were found in the superior longitudinal sinus, in the veins of the central convolutions, with small haemorrhages in the cortex and thrombi in branches of the pulmonary artery. Holst's view is that the delirium was the result of asthenia, the venous thrombosis a secondary result of the same cause.

Müller ⁴ _{Sept. 15} refers to 2 cases of melancholia simplex, occurring as a sequel of influenza, and reports a third case, which, from the symptomatology and the course of the disease, he concludes to have been dependent upon cerebro-spinal meningitis.

Ónodi, ⁸⁴ _{Mar. 21} before the Society of Physicians of Buda-Pesth, re-
₂₁₋₁

ported *parosmia* in three colleagues suffering with influenza. One smelted tar and pitch; another shellac, sulphur, garlic, and cadavers alternately; the third decomposing meat, soap, and petroleum.

Bernhardt,⁴⁴ before the Society of Physicians of the Charité, at Berlin, reported the case of a girl of 11, who, following an attack of influenza, attended with haematuria, presented a functional hysterical paralysis of the left arm. He also reported a case of nocturnal paralysis following influenza, in a neurotic man of 50, who complained of great weakness and tremor, and presented extreme feebleness of cardiac action. He could not move, after waking, until the arms and legs were rubbed.

Kleczkowski⁶⁷ _{Aug. 11} reports the case of a boy of 7 years, in whom there appeared, after a second attack of influenza, an utter inability to stand erect, which still existed seven months later, despite the most persevering treatment. The boy could move the extremities in various directions while in bed, but when lifted or taken by the arms muscular contractions took place. There was neither pain nor loss of sensation. Sensibility was rather accentuated. The reflexes were normal. There was nothing indicative of an organic lesion. At a meeting of the Laryngological Society of Berlin, Heyman⁴¹ _{Mar. 1} reported a case of bilateral palsy of the palate, following influenza, in a patient 12½ years old, in which improvement followed faradization. Herzfeld reported the case of a boy of 5, in which, twelve days after an attack of influenza, speech and hearing were suddenly lost. Nothing abnormal was found about the ears. The mouth could not be opened. There was no paralysis of the facial nerve. On the following day, hearing returned. As the boy could not stand or walk and did not feel deep pricks of a needle, hysterical paralysis was diagnosticated. Some days later, speech and sensation returned. Inglott² _{Apr. 11} reports a case of influenza in a woman of 32, in whom, during convalescence, consciousness was suddenly lost, while the eyes remained open, and the arms and legs remained in positions in which they were placed. The seizure lasted two hours, yielding to an enema of asafoetida and camphor mixture.

Churchhouse² _{Mar. 29} observed *tetanus* develop in a woman who had been nursing a case of influenza, and who had herself presented symptoms of influenza. Trismus, first noticed on taking

food, was followed by general rigidity, and finally by opisthotonus. Death occurred seven days after the onset of the symptoms. A wound was looked for, but none found.

Colley ⁶⁹ _{Aug. 28} presented, at a meeting of the Greifswald Medical Society, a case of *exophthalmic goitre*, which developed during an attack of influenza in a woman of neuropathic predisposition who had previously presented tachycardia and cardiac palpitation. He also refers to a like case reported by Holz. ⁶⁹ _{Jan. 16}

Erlenmeyer ⁴ _{Mar. 21} reports the case of a man of 25, without hereditary predisposition, not syphilitic or alcoholic, not addicted to morphine, having suffered no trauma, in which *Jacksonian epilepsy* followed an attack of influenza. In the first attack there was numbness of the left hand and arm, with muscular twitching, loss of consciousness, clonic convulsions, and suffusion of the face, neck, chest, and tongue. In the second, two convulsions followed in rapid succession, without loss of consciousness. It is supposed that the influenza occasioned a localized derangement of the cortex, perhaps a minute hæmorrhage in the cortical centre for the left arm.

A fatal case of *cerebral abscess* following influenza is reported by Aczel. ⁸⁴ _{Mar. 29} At the autopsy, an abscess as large as a hazel-nut was found in the posterior portion of the right frontal lobe,—a result, probably, of metastasis from a purulent bronchitis. Hoffmann, ⁵⁷ _{June 1} at a meeting of the Greifswald Medical Society, showed a case of cerebral abscess following otitis media suppurativa of influenza. Operating for pus in the mastoid process, he found, between the dura and the bone, an abscess connected with an abscess in the occipital lobe of the brain. Both were evacuated. Recovery was uninterrupted.

At a meeting of the Royal Academy of Medicine of Turin, May 23, 1890, Foá ² _{June 21} described the *lesions* which he had found in the spinal cord of a woman who had died of influenza. The patient had the usual symptoms, followed by bronchial catarrh, broncho-pneumonia on one side, hepatization upon the other. Sections of the spinal cord showed intense hyperæmia, the substance of the cord being dotted with minute red points. Microscopically, numerous hæmorrhagic foci were seen in all divisions of the cord, notably in the upper two-thirds of the dorsal and the upper portion of the cervical region. There was recent infiltration of red corpuscles among the nervous elements, which were

slightly separated and compressed, but not visibly altered in structure. Some of the vessels were obliterated, and it was in the neighborhood of these that the haemorrhages had taken place. Degenerative changes were also present in places, the axis-cylinders being enlarged to five or six times their ordinary size and the nerve-fibres degenerated. These degenerative foci were, as a rule, independent of the haemorrhagic patches, but in the highest part of the cord the two lesions were, in some places, found together. The haemorrhagic foci were chiefly situated in the posterior columns, almost always at their periphery; the degenerative foci occurred mostly in the lateral columns. Neither the gray matter nor the posterior roots showed the least alteration. Foá thinks that the lesions were due to occlusion of vessels, giving rise, in some places, to haemorrhage, and in others to alteration in the nutrition of the nerve-fibres. He also thinks it probable that the occlusion was caused by an accumulation of micro-organisms, but admits that he was unable to verify this conjecture. Examination of the brain was not permitted.

De Brun³¹_{Nov. 18} discusses the *nervous complications* of influenza. Meningitis may arise directly as a result of the general infection, in which case it occurs during the progress of the disease, or secondarily to otitis, in which case it occurs after the influenza has disappeared. As pulmonary congestion, with haemoptysis, occurs during an attack of influenza, so may cerebral congestion occur, manifested by headache, vertigo, perhaps transient loss of consciousness, without *sequelæ*. Under similar conditions, cerebral haemorrhage may take place, with typical hemiplegia. The myelitis of influenza may be diffuse or systemic. The most frequent variety of the former has been transverse dorsal myelitis. In some cases recovery has been spontaneous and rapid. The condition is one rather of congestion than inflammation. All cases, however, do not terminate so fortunately. The complications of the peripheral nervous system are the most common, and, among these, neuralgia takes first rank. Trigeminal neuralgias are most frequent. Next in frequency are intercostal neuralgias, then sciatica. Articular pains are common. In many cases neuritis is the source of the pain. Trophic changes sometimes follow. Optic atrophy has also been a sequel. Rarely, there has been anæsthesia. Disorders of motility are much less common than

those of sensibility. Influenza may re-awaken neuroses from which the patient has long been free, exaggerate existing or even provoke the explosion of neuroses in those who have never been affected. These nervous complications distinguish influenza from dengue.

Herzog⁴,_{Sept. 1} reports 2 cases of myelitis following influenza: 1 in a boy of 11, in whom the spinal symptoms appeared two months after the attack of influenza, and the other in a girl of 8, in whom the spinal symptoms appeared three weeks after the onset of the attack of influenza. Fiessinger⁵⁵,_{Oct. 18} reports a case of spinal meningitis in the course of influenza, in a girl of 18, in which death occurred on the eighteenth day, with symptoms of glossolabio-laryngeal paralysis. Remak, ⁴,_{Feb. 24} at a meeting of the Berlin Medical Society, reported a case of acute multiple neuritis in a man of 50, following influenza. The case is interesting from an etiological point of view, because it is held that multiple neuritis is always the outcome of some variety of infection. Henoch reported a similar case in a girl of 11. Eisenlohr, ⁶⁹,_{Mar. 20} at a meeting of the Hamburg Medical Society, presented 2 cases of rapidly progressive paralysis following influenza, of which 1 bore a certain resemblance to diphtheritic paralysis, being probably a peripheral neuritis, and the other an analogy to acute ascending paralysis, differing, however, in the participation of the bladder and the existence of cutaneous and muscular hyperesthesia. The latter was also probably a multiple neuritis of fulminating character. At a meeting of the Laryngological Society of Berlin, Krakauer⁴¹,_{Mar. 17} reported a case of paralysis of the left recurrent laryngeal nerve, with hoarseness and aphonia, after an attack of influenza, in a man of 39. The left vocal band maintained the cadaveric position, the right vicariously crossing the median line. Complete closure of the glottis could not be effected. Some degree of improvement followed faradization and administration of strychnine. In discussing the trigeminal neuralgia following influenza, Nothnagel¹¹⁴,_{Oct. 2, 1918} referred to the fact that it has long been known that various neuralgias occur in the course of influenza. Of 10 cases of trigeminal neuralgia under his observation, 8 had certainly been preceded by influenza. In all, alcoholism, syphilis, malaria, and carious teeth were excluded. In age, the patients ranged from 15 to 34; 6 were males, 2 females. In 3 cases the neuralgia set in during the febrile stage, in 4 after it.

The occurrence of trigeminal neuralgia in influenza is analogous to similar conditions in other infectious diseases. In addition, there is, in influenza, the nasal irritation. That the neuralgia is not due to the latter alone is evidenced by the occurrence of neuralgias in other situations.

Frankl-Hochwart¹¹⁴ _{v.17, No. 3, 4} reports 10 cases of neuralgia of the fifth nerve in association with influenza, in 3 of which the neuralgia appeared during the existence of the fever. In 5 cases the paroxysms recurred at the same hour. Strong faradic currents proved useful in treatment. Westphalen²¹ _{May 26} observed neuralgia, especially involving the trigeminus, as one of the most common complications of influenza. Involvement of motor nerves was rare, excepting those supplying the ocular muscles. Joffroy³ _{Apr. 2} observed 6 cases of scapulo-humeral neuralgia, directly consecutive to attacks of influenza. Two of the patients presented evident atrophy of the deltoid, the supra-spinatus, the infra-spinatus, and the pectoralis major. In one, the atrophy also involved the biceps. All the muscles named presented reactions of degeneration, the result probably of preceding neuritis. Fukala, ⁵⁷ _{June 29} in reporting 2 cases of paralysis of accommodation following influenza, states that it is characteristic of this affection to last for a long time, obstinately resisting treatment. It may occur alone or in association with paralysis of other muscles supplied by the third nerve. One eye is usually affected, or, if both, one in greater degree than the other.

Bergmeister⁸⁴ _{Mar. 8} reported, at a meeting of the Society of Physicians of Vienna, 1 case of loss of accommodation, 1 of neuritic optic atrophy, and 1 of simple optic atrophy, in all of which, it was stated, vision had been unimpaired prior to an attack of influenza. Gillet de Grandmont²⁹⁰ _{Jan. 21} observed three characteristic periods in the course of influenza. The first was marked by nervous disorders, the second by congestive complications, the third by organic degenerations. Each of these corresponds with different oculomotor derangements. In the first there is pain at the muscles of the eye, the patient preferring to close the eyes rather than suffer the fatigue of moving the muscles. During the second there are distressing sensations of luminous, scintillating spots before the eyes, occasioned by derangements of the retinal circulation. If the congestion is excessive, there may be hyaloiditis, or even miliary haemorrhages into the retina or choroid. In the third stage, in certain

hypermetropes and presbyopes, who have gotten along without glasses, proximal vision may be lost in consequence of pareses of the muscles of accommodation.

Bernhardt was interrogated about a case of diabetes, in which sugar disappeared from the urine and thirst diminished after an attack of influenza, while anorexia and rapid emaciation set in. Senator replied that he had seen the sugar in the urine in diabetes diminish and disappear in the course of febrile affections as well as in influenza. Saundby² _{May 10} reports 2 cases of diabetes observed after attacks of influenza, one in a man of 30, the other in a woman of 22.

Haug³⁴ _{Feb 25} makes three main groups of the *ear complications* of influenza. The first sets in with hyperæmia and swelling of the Eustachian tubes, tympanum, and tympanic membrane, which may disappear in the course of from ten to twenty days, or may be followed by exudation, the transition to the second group. The tympanic cavity becomes filled with fluid, the tympanic membrane infiltrated. The fluid, first serous, becomes mucous, then purulent, and in from two to five days rupture may take place. The discharge may continue for from three to five weeks, becoming progressively less, until finally cicatrization at the site of rupture takes place. Haug³⁴ _{Jan 21} describes hæmorrhagic otitis media as characteristic of the epidemic. It sets in between the third and seventh day of the disease, and is attended with hæmorrhagic effusion into the tympanum, manifested by intense pain. Spontaneous perforation usually takes place in the course of twelve hours. Dreyfuss and Schwabach¹ _{May 24} describe a form of ear disease frequently resulting from influenza. Ecchymoses, varying in size from a pin-head to a pea, occur in the membrana tympani, and exudation, serous, purulent, or hæmorrhagic, takes place. The most successful treatment was early paracentesis. Glover³⁷ _{Feb} reports 2 cases of otitis media acuta, 12 cases of otitis media acuta suppurativa, and 1 of otitis externa et media following influenza. The cases pursued a relatively rapid course. After the primary period, the pain was intense and hearing became impaired.

Gruber,³⁴ _{Mar 5} at a meeting of the Society of Physicians of Vienna, presented tables showing the enormous increase in the cases of catarrhal and suppurative otitis media treated at his clinic during the months of November, December, and January, 1887, 1888, 1889, and January, 1890. The inflammations were

of a high grade of intensity, and, what is otherwise unusual of purulent processes, bilateral. The affections were marked from the outset by extraordinary hyperæmia, which extended to the adjacent bones and soft parts. The tympanic membrane was more commonly than usual involved from the beginning. In 6 cases it was necessary to open the mastoid process. Politzer stated that he had operated upon the mastoid process in 10 cases of otitis following influenza. Chatelier³⁷ reports 5 cases of otitis media suppurativa following influenza, in which an opening was made in the mastoid process to evacuate the pus. Recovery followed in each.

Peter¹⁴ _{Jan. 19} saw a case of influenza in which purulent catarrh of the ear existed for a long time, and to which was finally added a brachial monoplegia, soon accompanied by paralysis of the lower extremity, and, finally, by aphasia. There was here a meningo-encephalitis, the result of the ear disease, the outcome of grippe.

Wilks⁶ _{May 9} has emphasized the extreme prostration and *cardiac weakness* which occasionally follow attacks of influenza. He observed 4 fatal cases in professional men, without any history of previous heart disease, in which the weakness of the heart was apparently the immediate cause of death. Aufrech⁶⁹ _{Oct. 16} also lays stress upon the danger of cardiac failure in the course of influenza. Tisné¹⁵² _{June 13} states that fatal asystole may result in a case in which the heart is already damaged. In 1 case of chronic rheumatism, without cardiac murmur, characteristic endocarditis was observed to develop. Myocarditis also resulted from influenza. Cardiac asthenia from nervous derangement was a fatal complication of pneumonia. Röhrling⁷⁵ _{Aug. 1} has reported the case of a soldier, aged 33, without neurotic associations, who, after an attack of influenza, presented the symptoms of angina pectoris, and the physical signs of hypertrophy and dilatation of the right side of the heart.

Haushalter¹⁸⁴ _{Aug. 1} records a case of *endocarditis* following a relapse of influenza. The patient, a female domestic of 26, was suddenly seized with intense dyspnoea. The pulse became small, the face cyanotic, the body covered with a cold sweat, the lungs full of râles. No cardiac murmur had been detected. Death took place, and the autopsy revealed, in addition to pleural and pericardial effusions, oedema, congestion and atelectasis of the lungs, vegetations upon the auricular surface of the mitral valve. In a second case, in a

chlorotic girl of 23, in which there was a soft, mitral, systolic murmur, a diagnosis of endopericarditis was made. In a third case, in a woman of 66, in which dyspnoea and cyanosis were present and no heart-murmur was detected, right hemiplegia suddenly developed, followed by coma and death. The myocardium was found to be fibroid in places, the aorta atheromatous, while upon the free margins of the aortic semi-lunar valves were coherent, fibrinous vegetations of various sizes. In the left Sylvian artery, in the central region, an embolus was found resembling the vegetations on the aortic valves.

Surmont,¹⁷ at a meeting of the Société de Médecine du Nord, reported a case of infectious endocarditis, following influenza, in an alcoholic patient with pneumonia who succumbed rapidly, presenting multiple emboli and meningeal phenomena.

Cross² _{Apr. 26} has reported the case of a woman aged 49, who, a week after an attack of influenza, complained of severe pains in the arms, which were found to be hard, swollen, and tender, with all the appearances of *phlegmasia*. It was fully a month before the arms returned to their original condition. Burghard² _{May 3} has reported 4 cases in which phlebitis of the left femoral vein was observed,—in 1, two weeks after; in each of the remaining 3, three months after an attack of influenza. Matlakowski⁵²⁰ _{No. 33} reports 2 cases of venous thrombosis in association with influenza. In one the left, in the other the right, was involved.

Loison²¹¹ _{Aug. 17} has reported a case of *gangrene* of the leg in the course of influenza, in an otherwise vigorous man of 37 years of age, with no detectable lesion of heart or vascular system. On the sixth day the patient had an attack of diarrhoea, which responded to treatment. On the night of the following day, without preceding exertion, shock, traumatism, or compression, a sensation of numbness was suddenly perceived in the left leg, below the knee. This was followed by formication, weakness, discolouration, and coldness. Pulsation could be detected in the femoral artery at the highest part of the thigh, but not in the posterior tibial or in the dorsal artery of the foot. Elevation and occlusion dressings were applied for a time, but, finally, amputation was performed. The operation was strikingly bloodless, although no special measures to control haemorrhage were taken. A firm, adherent clot occupied the femoral artery from the level of amputation to the popliteal

space. The anterior tibial and the peroneal were almost empty, a short distance above the ankle being entirely dry. The femoral vein was also occluded by a soft clot, which, in the veins at the calf, was of the consistence of currant-jelly. Both arteries and veins were yielding. Microscopic examination of the endothelium was embarrassed by the condition of gangrene. There was nothing in the case to explain a lesion of the endothelium except influenza. The view of Loison is that the original lesion was embolic, thrombosis forming secondarily.

Rheiner²¹⁴ _{Jan. 15} reports the case of a woman of 30, the mother of several healthy children, who, after an attack of influenza of three weeks' duration, developed a fatal *pernicious anaemia*, with enlargement of the spleen, chills and fever. The autopsy failed to reveal any characteristic pathological lesions.

Olivier²⁰³ _{Mar. 1} reports 4 cases of *pseudo-rheumatism* in influenza, and concludes: 1. In the decline of, or in the convalescence from, influenza, one observes in certain non-rheumatic subjects articular manifestations, differing from those of rheumatism by their fixity and their course. 2. These arthritides may present different forms, —arthralgiae, mono-arthritides, subacute polyarthritides, —approaching, in their onset and their character, infectious pseudo-rheumatism. 3. They may be accompanied by cardiac disorders, —arhythmia, soft apical murmur. 4. They recover by rest, envelopment in cotton, salicylate of sodium, antipyrin, in two to three weeks. 5. They do not appear to give rise to suppuration or ankylosis of the involved joint.

As regards *genito-urinary complications*, Trossat²¹¹ _{Mar. 20} has reported a case of cystitis in a woman entirely free of vesical derangement prior to the onset of an attack of influenza. In 2 cases acute exacerbations of a chronic catarrh of the bladder occurred. Menstruation was deranged, being absent or scanty, or excessive, in some instances painful. In 1 case vicarious epistaxis occurred. One patient, with only moderate fever, aborted at six weeks.

Leyden⁴ _{Mar. 10} reports a case of influenza in a woman who seemed never to have recovered. Finally, vomiting set in. The urine was passed in small amounts and oedema developed. The urine was haemorrhagic and albuminous. Death occurred, and at the section glomerulo-nephritis was found. Leyden also saw 3 fatal cases of nephritis combined with pneumonia.

Before the Greifswald Medical Society, Mosler⁵⁷ reported a case of influenza in a laborer of 17, in which a *haemorrhagic diathesis* manifested itself. Death occurred from uræmia, the result of a haemorrhagic nephritis. The autopsy revealed nephritis, cystitis, and gastro-enteritis haemorrhagica, in addition to pleurisy, pericarditis, hypostatic pneumonia, and bronchitis.

Ewald⁵⁸ reported a case in a woman of 32, in which the diagnosis of preceding influenza rested upon the statements of the patient and her friends. Purpura haemorrhagica developed, together with bilateral pneumonia. There were haemorrhages from the gums and nose, and the patient died in collapse. Ante-mortem examination of the blood revealed a diminution of the number of red corpuscles to 2,000,000, and of the amount of haemoglobin to 50 per cent. At the autopsy, in addition to the pneumonia, there were found ecchymoses of the skin and pericardium, haemorrhages in the mucous membrane of the stomach and of the pelvis of the kidneys.

Mesnard¹⁸⁸ has reported a case of influenza in a woman of 22, in which *haemoptysis* occurred, while only the signs of a bronchitis could be detected, which three months later had entirely disappeared. A special name has been given to cases in which haemorrhagic complications are present—"haemorrhagic influenza." Mesnard has also seen epistaxis in the course of influenza.

Before the Society of Physicians of the Charité, at Berlin, Landgraf⁴ reported having seen 5 cases of *intestinal haemorrhage* in connection with influenza, 1 of which terminated fatally.

Schwimmer,⁸⁴ at a meeting of the Society of Physicians, Buda-Pesth, reported having seen cases of herpes iris and circinatus, erythema iris and circinatus, erythema scarlatiniforme, and erythema exsudativum multiforme in connection with influenza. He considers these as *angio-neuroses* belonging to the same category as the medicamentous rashes. Urticaria and a morbillloid exanthem were also observed. In 3 cases, psoriasis developed in patients who had previously never had psoriasis.

Fuchs²² had under observation a case of influenza, complicated by an ominous *corneitis*, which commenced as vesicles. The latter rupturing, small ulcers remained. From the arrangement of these the name keratitis dendritica was taken. Kahler also observed a case of influenza complicated by keratitis dendritica.

Lostalot,¹⁵² in a communication to the Société Clinique de Paris, reported a case of influenza complicated by purulent *parotiditis* and œdema of the larynx in a woman 28 years old, who had repeated chills, fever, violent headache, muscular and articular pains, anorexia, and nausea at the close of an attack of influenza. In the course of a day or two, an adeno-phlegmon of the parotid gland of one side developed, with intense inflammatory œdema of the face and neck. Deep incision brought only black blood, mixed with a little pus. On the following day, although the swelling of the face had somewhat subsided, an attack of suffocation necessitated immediate tracheotomy. The patient ceased to breathe, but revived after artificial respiration had been practiced for five minutes. Subcutaneous emphysema and suppuration supervened, but submitted to appropriate treatment. The patient finally recovered.

Surgical Complications.—Ewald⁶⁹ has reported the fatal case of a medical man with suppuration of the antrum of Highmore, following influenza. The autopsy revealed a circumscribed, peri-vascular, purulent, basal meningitis. Möser⁴ reports 2 cases of periostitis of the upper jaw, occurring four and five days, respectively, after the onset of influenza. In one, suppuration took place. Evacuation of the pus afforded relief. In the second, suppuration occurred, in addition, at the mastoid process, followed in turn by otitis media.

Bacelli⁶ observed that, in the surgical wards, during the prevalence of influenza, indolent ulcers and traumatic lesions assumed a gangrenous character,—it was believed as a result of infection by the microbe of influenza. Four cases of pyæmia are reported by Bennett⁸ occurring in surgical patients, after attacks of influenza, while still under observation.

Influenza in Children.—Comby¹¹⁸ found respiratory complications rare and benign in children. Of 218 cases, bronchitis, usually of a mild character, was present in 18. In a child of 4, recovery was retarded by broncho-pneumonia at the left base. One case, in a child of 2 months, was complicated by fatal athrepsia. Anæmia and emaciation sometimes succeed the disease. Auscultation of the vessels of the neck in 6 cases detected a continuous souffle, with reduplication. Complications involving organs of special sense were relatively frequent. Of 218 cases, conjunctivitis or keratitis was

seen in 14. In 13 there was otitis media, with perforation and discharge of pus. Treatment with tepid irrigation, followed by powdered boric acid, was successful. There was 1 case of tibio-tarsal arthritis and 1 of catarrhal jaundice. Meyer⁶⁹ observed an infant at the breast of a mother suffering from influenza present similar symptoms in the course of a few days.

Influenza in Pregnant Women.—Cameron²⁸² reports 3 cases in which abortion took place within five days from the onset of attacks of influenza. The loss of blood was unusually great. In one case, uterine haemorrhage and uterine tenderness persisted for ten days after delivery.

Lwow²¹ reports 8 cases of influenza in the second and 2 in the first half of pregnancy, in multigravida. Of the former, 2 aborted on the fourth and fifth days of the disease, respectively. Of the latter, 1 aborted on the seventh day, the other two months later. In this case, the membranes had undergone fatty degeneration, and there was also endometritis deciduialis haemorrhagica.

Diagnosis.—The diagnosis of influenza may be exceedingly simple or embarrassingly difficult. The knowledge of the existence of an epidemic will aid in arriving at a conclusion. The disease which influenza most closely resembles is dengue. So close is the likeness that for some time the French medical profession were divided as to whether the epidemic of 1889-90 was one of influenza or one of dengue. There are, however, a number of differentiating features. An ordinary attack of influenza lasts from three to ten days; of dengue, from one to three weeks. The former is marked by muscular debility; the latter, by intense articular pain, especially at the knees, occasioning a characteristic limping gait. Catarrhs of the various mucous membranes constitute the rule in influenza, the exception in dengue. The latter presents a characteristic eruption. In influenza, eruptions are rather exceptional, and, when present, variable. The temperature of dengue is apt to be remittent, and higher than that of influenza. Convalescence from influenza is generally rapid; from dengue, slow and tedious.

For a few days, influenza and typhoid fever might be confounded with one another. The former, however, does not present the dilated pupil so often seen in the latter, nor ever a rose rash; the temperature curves of the two diseases are distinctly different, and the characteristic stool of typhoid fever is wanting in influenza.

In cases in which a rash is present, some doubt may arise as to the existence of scarlet fever or of measles. In influenza, however, the rapidity of pulse, the characteristic appearance of the tongue, the glandular involvement of scarlatina, are wanting, and the further course of the two diseases is different. Measles and influenza may be so much alike that real difficulty in the diagnosis may arise. Influenza may present a morbillloid eruption, while, in both, catarrhal symptoms are prominent features; but the duration of the exanthem, the age of the patient, the occurrence of other cases in the same family, and the character of the *sequelæ* are the points of distinction.

Meningitis or peripheral neuritis may complicate influenza. In the uncomplicated disease, however, the muscular contractions, the paralyses, and the changes in the eye-ground of the former and the loss of power and degenerative reaction of nerve and muscle of the latter are wanting.

Treatment.—There is no recognized specific against the disease. Quinine more nearly approaches this position than any other remedy.

C. Graeser⁴,₁₉ recommends quinine as a prophylactic for influenza, quoting Eichhorst as designating quinine a specific in this disease. Seven and a half grains (0.50 grammes) should be given daily. Tranjen,⁴,₁₇ a military surgeon in Bulgaria, following this suggestion of Graeser, directed at the outset of the epidemic that every member of his battalion be given 0.30 grammes ($4\frac{1}{2}$ grains) of sulphate of quinine daily, and that manœuvres in the open air be forbidden. This was continued for twelve days. While the epidemic spread in the immediate vicinity of the barracks, few of the soldiers were affected. Similar good results, however, were not had when the disease already existed. Then antipyrin rendered the greatest service.

Duboy,⁸⁴,₂₂ at a meeting of the Society of Physicians, Buda-Pesth, compared influenza to malaria. Anæmia is a common sequel of both. Recovery was most rapid from the administration of quinine. As a prophylactic measure, he prescribed 3 grains (0.20 grammes) twice daily. Of 26 cases thus treated, influenza occurred in but 2, and in these in a mild form.

After the onset of the disease, the patient should go to bed, taking, if there be no contra-indication, a mercurial, followed by a

saline. The diet should be light and easily digestible. The secretions should be maintained. Good results are to be expected from a distinctively diaphoretic treatment. In the only 3 cases treated by Eichhorst,²¹⁴ _{Mar. 1} with subcutaneous injections of pilocarpine, the results were strikingly speedy and successful. Pyrexia may be met by cold sponging, cold affusions, the cold pack, or the cold bath. Antipyrin, antifebrin, and kindred remedies were largely used during the epidemic, and unquestionably rendered excellent service. Giovanni,⁵⁴⁰ _{Jan. 25} however, wisely warns against the use of the ordinary antipyretics in the treatment of influenza, because, though they may lower the temperature, they aggravate the adynamic state of the patient. He recommends rather tincture of strophanthus, from 1 to 5 minimi (0.07 to 0.33 grammes), with milk and cognac, and in grave cases inhalations of oxygen and subcutaneous injection of strychnine.

Nothnagel⁵⁷ _{Jan. 12} emphasizes the fact that the greatest care must be exercised during convalescence, which may be tedious and protracted.

Gellie,¹⁸⁸ _{Mar. 9} in a communication to the Société de Médecine et de Chirurgie de Bordeaux, as an outcome of results obtained by himself and by some of his friends, strongly recommends the use of sulphate of quinine in the treatment of influenza. Large doses should be administered, in accordance with the age and temperament of the patient and the severity of the attack. Quinine is a nervine and antiseptic, and, it is claimed, notably abridges the duration of the disease and prevents grave complications.

Wood¹¹² _{Mar.} obtained the best results from diaphoresis followed by quinine. He found a combination of pilocarpine and morphine to act better than antipyrin:—

R. Pilocarpinæ hydrochloratis, gr. ss (0.03 grammes).
 Morphinæ sulphatis, gr. $\frac{1}{2}$ (0.02 grammes).
 Aquæ, f. $\ddot{\text{z}}$ ij (96.00 grammes).
 M. Sig.: A teaspoonful every fifteen minutes, pro re nata.

The following formula acted favorably when pulmonary complications existed:—

R. Ammonii chloridis, 5ij (8.00 grammes).
 Apomorphinæ hydrochloratis, gr. j (0.07 grammes).
 Mist. glycyrrhizæ comp.,
 Syrupi, $\frac{1}{2}$ f. $\ddot{\text{z}}$ iss (45.00 grammes).
 M. Sig.: A dessertspoonful every two or three hours.

Diarrhœa, when present, was controlled by 10 grains (0.65 grammes) of subnitrate of bismuth and 1½ grains (0.10 grammes) of carbolic acid, given in capsules every two, three, or four hours.

Dujardin-Beaumetz⁶⁷ has formulated the treatment of the different varieties. In the painful form, he found antithermic analgesics to render signal service. Among these, antipyrin and exalgine hold the first place. Phenacetin, 15 grains (1 grammes), twice a day, may be prescribed. These failing, injections of morphine may be made. In the gastro-intestinal form, absolute rest in the recumbent posture should be maintained, and preparations of opium, of which paregoric is the best, administered. In the catarrhal form, quinine, 4 grains (0.25 grammes), morning and evening, should be given, alone or combined with antipyrin, 15 grains (1 grammes). Aconite is also useful in this variety. Stimulants may be required. Pulmonary complications call for cardiac tonic treatment:—

R. Caffeinæ,
 Sodii benzoatis, 5*ss* gr. xxx (2 grammes).
 Aquea bullientis, 3*ss* (6 grammes).
 M. Sig.: $\text{M}_{\text{L}}\text{XV}$ b. vel t. d., subcutaneously.

If possible, convalescence should be spent in the country.

Peter¹⁴ recommends for the cephalalgia and rachialgia a blister to the nucha. The pulmonary hyperæmia may be relieved by a like application to the chest. Similar treatment may be directed to the otitis. Syncope should be combated by injections of ether. Convalescence requires quinine.

MacLagan⁶ prescribed salicin, 20 to 40 grains (1.30 to 2.60 grammes), every hour, for three or six hours; then, every two hours, for a day; after that, at long intervals. He reports that convalescence commenced in twenty-four hours in all cases, and, in most, in twelve hours. There were no serious complications. In a large number of cases, Rabener⁵⁷ obtained excellent results from the administration of creolin, 0.01 grammes ($\frac{1}{6}$ grain) every two hours, and inhalations of a 10-per-cent. solution. The complications are to be treated on general principles, special attention being directed to the condition of the heart, and sustaining measures instituted from the first.

Moure¹⁸⁸ treated the laryngeal complications by sprays of carbolic acid, cocaine, boric acid, and resorcin:—

R Acidi carbolicr cryst., 9 to 15 grains (0.60 to 1.00 grammes).
 Cocainæ hydrochloratis, 3½ to 7½ grains (0.24 to 0.50 grammes).
 Glycerinæ, f 3 iss (45 grammes).
 Aq. dest., f 3 xiv (420 grammes).

M. Sig.: Spray t.i.d.

R Acidi borici, 75 grains (5 grammes).
 Resorcinæ cryst., 30 grains (2 grammes).
 Aq. laurocerasi, f 3 iss (45 grammes).
 Aq. dest., f 3 xiv (420 grammes).

M. Sig.: Spray, three to five minutes, morning and evening, or three or four times a day.

Gendre ²⁹⁶_{Feb. 3} treated the persistent bronchitis of influenza with terpine and balsam of Tolu, of each 1½ grains (0.10 grammes), six or eight times daily, or he prescribed the following formula:—

R Terpine, 30 grains (2 grammes).
 Tar, 30 grains (2 grammes).
 Balsam of Tolu, 90 grains (6 grammes).
 Benzoate of sodium, q. s. ut ft. pil. no. lxxx.

Sig.: Take six to eight pills daily.

Haug ³⁴_{Feb. 25} summarizes the treatment of the aural complications as consisting in inflation of the tympana, the use of gargles, inhalations, insufflations, together with the administration of antipyrin, phenacetin, and quinine. In the exudative form, when the pain was severe, local blood-letting in the temporal region, ice-bags behind or about the ear, and, in some cases, iodine locally to the mastoid, formed the treatment. Subsequently, if paracentesis could not be performed, warm instillations into the external auditory canal were made hourly. If pain increased and the temperature rose, while exudation was detected in the middle ear, with pain and sensitiveness in the mastoid region, paracentesis afforded the greatest relief. Then, inflation was practiced, the canal syringed with an antiseptic solution and packed with gauze. Subsequent secretion was removed with cotton. Insufflation of powders is objectionable in these acute perforative cases, on account of obstruction from admixture of powder and pus.

Nothnagel ¹¹⁴_{V. 17, No. 3, 4} recommends the faradic brush in the treatment of the neuralgias of influenza. The painful nerve is included between the two buttons of a brush especially constructed for the purpose, or between two ordinary wire brushes, kept stable, and a faradic current, at first weak, but gradually increased in intensity. The application lasts from half a minute to two minutes. From eight to thirty séances are necessary.

The treatment of influenza has been in the main expectant-symptomatic. On account of the contagiousness of the disease it is well to isolate the patient and have only a single person, or two in alternation, in attendance. Rest in bed is to be insisted on, and the diet should be simple, concentrated, nutritious, and digestible. The activity of skin, kidneys, bowels, lungs, and heart should be maintained, and strength conserved by supporting measures. A specific remedy has yet to be discovered. Of the many drugs used, some form of cinchona, as quinine or cinchonidine, in doses of from 2 to 5 grains (0.13 to 0.32 gramme) thrice daily, has proved the most efficacious. Sodium salicylate (gr. viiss to xv—0.5 to 1 gramme) or salol (gr. ii to v—0.13 to 0.32 gramme), in suitable cases combined with phenacetin (gr. i to iij—0.065 to 0.19 gramme), has measurably secured relief from pain. The more powerful coal-tar antipyretics are to be eschewed. High temperature may call for cold sponging or affusions or applications of ice. Heart-weakness may demand caffeine (gr. ss to ij—0.032 to 0.13 gramme) or cocaine (gr. $\frac{1}{8}$ to ss—0.022 to 0.032 gramme) or strychnine (gr. $\frac{1}{60}$ to $\frac{1}{20}$ —0.0011 to 0.0032 gramme), and general circulatory depression digitalis (tincture, $\frac{1}{2}$ iii to x—0.18 to 0.62 c.cm.; infusion, $\frac{1}{2}$ iii to iv—4 to 16 c.cm.) or strophanthus ($\frac{1}{2}$ v to xv—0.31 to 0.92 c.cm.). The complications have been many and have required varied treatment. The patient must not arise too soon. Convalescence may bring with it the need of tonics, as quinine, arsenic, iron, strychnine, and obstinate asthenia may demand prolonged abstinence from ordinary avocations and sojourn in the mountains or by the sea, or even a sea-voyage.

INFLUENZA.

(From the ANNUAL for 1892.)

Bacteriology.—Kirchner ⁵⁸ _{Dec. 27, '90} has found a diplococcus that in some respects resembles the pneumococcus described by Fraenkel and in others that described by Seifert. It differs from the pneumococcus in not staining by Gram's method, and from the organism described by Seifert in possessing a capsule that stains with gentian-violet or with carbol-fuchsin and Loeffler's alkaline methylene-blue.

In view of the propagation of influenza in the year 1890, from Russia as a centre, Baillière ²¹¹ _{June} alludes to the fact that a streptobacillus, similar to that described by Seifert and Jollés, was found in the drinking-water of Moscow. Associated with this germ, which was thought to be characteristic of the disease, are found other parasitic elements, namely, the streptococcus, the staphylococcus aureus, and the pneumococcus, the character of the symptoms being determined by the prevalence of one or the other form. In reviewing the subject, Baillière notes that Bouchard has found the ordinary bacterial elements in connection with influenza, namely, the staphylococcus pyogenes aureus, the pneumococcus, and the streptococcus; Jollés, the encapsulated diplococcus, afterward described by Netter and Herring; and Klebs, the flagellate body found in the blood (an *hæmatozoön*). The majority of authorities look upon the encapsulated streptobacillus as the characteristic organism.

Roux ²¹¹ _{Aug. 9} has detected the presence of a streptococcus in the blood of influenza patients when the fever was at its highest, but has shown that the presence of the organism was not constant; at least, as a streptobacillus. He considers the characteristic organism as polymorphous, exhibiting differences that account for the varying phases of the disease, though usually appearing as a diplo-

coccus. Teissier and Fraenkel, in experimenting with the diplococcus found by Roux and Pittion,²¹¹ have found that the organism is pyogenic, and that the pus obtained from an abscess of the ear of a rabbit that had been inoculated and prepared by Gram's method contained neither streptococci nor staphylococci, while bouillon cultures of the pus in twelve hours developed motile diplococci resembling those that were originally injected into the ear. In one drop of this culture treated by Gram's method the diplococci were decolorized, and no other micro-organisms were detected. Nakahama²⁰⁰ _{v.10,p.97} examined the sputa of 30 patients suffering from influenza. In 27 cases staphylococci and streptococci were found; in 7, the encapsulated bacteria (the streptobacillus of Roux). Staphylococci and streptococci occasioned no reaction in animals, while the encapsulated bacteria induced a slight effect in rabbits and proved fatal to guinea-pigs. By cultivation the virulence of the encapsulated bacteria was gradually diminished, and, after cultivation for four weeks, of two guinea-pigs that were inoculated but one died. After cultivation for four months the bacteria entirely lose their virulence. Although the encapsulated bacterium is different from Friedländer's pneumococcus and from Fraenkel's pneumobacillus, it was found to be quite similar to that discovered by Nichroff. Adler¹⁵⁰ _{May 15} concludes, that the specific of infection (a microbe as yet not definitely described) first invades the blood, since on this hypothesis alone can we account for the acute appearance of the symptoms and the affection of the organism, simultaneously, in every part.

Epidemiology.—Arcularius¹⁵⁰ _{June 15} dates the beginning of the 1891 epidemic in New York from March 20th and its subsidence on May 10th. The development of the epidemic was slower than that of 1890. The various classes of society were equally attacked. Those who by their occupation are supposed to be less prone to attacks of "cold" showed no immunity. The tendency to relapse was more marked than in the previous year. The majority of those attacked in 1891 had already suffered during the previous epidemic. The period of incubation appears to have been more protracted during the epidemic of 1891. Masterman²⁶ _{Sept.} thinks that, "from the extraordinary and rapid extension of influenza over nearly the whole of the habitable globe and its contemporaneous appearance in widely separated regions, it is most proba-

ble that some atmospheric condition must have induced it; and from the observation of Asmann and Masson, extending over the whole of Europe, we gather that from the date of the invasion to the height of the epidemic—from the beginning of November to the third week in January—the meteorological records are characterized by high barometric pressure; very little rain; little moisture in the air; rapid evaporation from the earth; the prevailing winds, N.E. and N.N.E.; sky generally cloudy; dry soil; diminution of ozone; and low electrical charge of the air. In Paris, Berlin, Vienna, and Brussels there was noted an unusually high barometer, the curves of the mortality and high pressure being coincident. Singularly enough, however, this is not the case in Russia; and in Paris the prevailing winds were S. and S.W.; but in every case the air was extremely dry, and yet there was very little sunlight, the dull, cloudy skies everywhere intercepting it." Van Rensselaer²¹⁶ Apr. calls attention to the fact that in both of the recent epidemics the course of the spread of the disease has been influenced by natural obstacles, such as mountain-ranges and seas. He writes: "In those countries hemmed in by these safeguards—Spain, Italy, England, and the Balkan States—it appeared among the last, and finally reached Norway. It did not seem to spread to the latter country from Sweden, which was early attacked, but by the way of Denmark, its course having been checked by the intervening mountains. To America and other foreign countries it was evidently brought by steamers. Once having entered cities, it first attacked those who congregated in great numbers in large buildings, as in post-offices, banks, schools, factories, and soldiers. Men were generally attacked earlier than women, and, in general, those of an out-door life than those of sedentary habits. From all these facts it seems probable that human beings act as hosts for the germs, giving them off to their fellows, and that the epidemic is not a miasmatic, but rather a contagious miasmatic, or a purely contagious disease." Parsons²¹⁷ maintains that attacks of influenza do not occur simultaneously over large tracts of country, and that it has never been proved that the disease travels faster than men can travel. He claims that the apparently sudden and wide-spread outbreak can be accounted for by the failure of diagnosis in the early cases. In the official report to the Local Government Board he²¹⁸ further considers the probability of true influenza being

always prevalent as ordinary catarrhal fever in a form of mild intensity in the interval between the more violent outbreaks, and of epidemic occurrences being simply due to certain conditions that give to an ordinary semi-specific contagion unusual virulence and rapid dissemination. Baillière ²¹¹ June 7 cites Griesenger (1860) as the first to include influenza among the infectious diseases. Even before this Graves had looked upon the disease as a general specific affection, while Monneret and Fuster considered it simply a catarrhal affection. Parsons ² Aug. 8 dates the appearance of influenza in England from the end of February. Cases were first reported at Hull, which seemed to be the starting-point of the epidemic. In the United States, influenza occurred epidemically in Chicago early in March, and in New York early in April. Its prevalence in Russia has not been reported, although on April 24th cases were reported as present in the towns of Southern Russia, and on May 15th it was reported as epidemic in Russian Poland.

Willis ²⁰⁰⁷ July 10, ²²⁴ Sept. 12 suggests that the disease may take its rise from the intrusion into the atmosphere of some poisonous gas of such density as to penetrate everywhere.

Dubrulle ³⁶³ Aug. 1 expresses himself unequivocally as to its contagiousness. The prominence of nervous phenomena suggests the etiologic existence of a poison that acts directly upon the nervous system, in consequence of a primary infection of the blood. The part played by the ordinary micro-organisms found is probably subordinate, and secondary to that of the specific organism of influenza, which Dubrulle, by analogy with malaria, concludes to be a haematozoon.

Contagion.—Townsend ⁵¹ Jan. reports a case of congenital influenza. Catarrhal symptoms were observed in an infant immediately after birth. There was elevation of temperature, the highest point being 104° F. (40° C.), although there were no abnormal signs found in the chest. The mother was just recovering from a well-marked attack of influenza at the time of her confinement. Crendiopoulos, of Smyrna, ⁸⁷ Aug. 21 places the period of invasion at from three to six days, and, in a report of a number of cases, emphasizes the probability of spread by contagion. Courrent ¹⁰⁰ Aug. 20 recounts a typical case of contagion, in which a lad, recently exposed to infection, was sent by his parents from school to a village that had been entirely free from cases of influenza. On

the way to his destination the boy was seized with headache and lassitude, and during the course of the next four days suffered from symptoms markedly characteristic of the disease. At the end of the fourth day the young girl that nursed him was also affected; and the disease spread from her to the other members of the family, affecting, in succession, those that were most directly exposed to the contagion; and finally the disease became prevalent throughout the village. The period of incubation appears to have been four days. Gwynne ^{Aug. 29}⁶ concludes that the period of incubation is variable. Weber ^{May 15}¹⁵⁰ speaks of the epidemic of 1890-1891 as without any period of incubation, and is strongly opposed to the theory of contagion, because of the occurrence of the disease simultaneously in widely separated localities, and because of the immunity of certain regions in direct communication with infected districts. Arcularius ^{June 18}¹⁵⁰ states that the longer incubation period of this year favors the theory that the disease has spread by miasmatic infection. Although it appears that the first invasion and the early progress depend upon a miasm, contagion effected the spread from house to house after the first appearance of the disease in a community. From the preponderance of the catarrhal symptoms, Parsons ^{July 11}⁶ recognizes the probability that the poison of influenza finds entrance into the system by means of the air-passages. At the same time Thorne ^{July 11}⁶ alludes to the capillary congestion of the conjunctivæ as a strong evidence of the conjunctiva being the structure generally attacked by the infecting material. He admits that the infecting material acts most pronouncedly on the cerebro-spinal nerve-centres.

Duration.—Gwynne ^{Aug. 29}⁶ has observed that, of 200 cases, 58 were convalescent in five days or less; 73 recovered within between five and ten days; 21, between ten and fifteen days; 16, between fifteen and twenty days. He includes in the last group cases with some one of the usual complications, such as pneumonia, bronchitis, pleurisy, etc. The duration of well-marked cases of influenza in children has been observed by Mackenzie ^{Aug.}⁹⁰ to be very short. In 6 carefully-observed cases the febrile stage lasted only twenty-four hours.

Mortality.—Parsons ^{Aug. 8}² estimates the number of deaths in London to be primarily attributed to influenza, during the thirteen weeks ending July 4, 1891, to be equal to a ratio of 1.9 per 1000

inhabitants. He states that "the epidemic in London of the present year has been more protracted and more fatal than that of 1890, though it seems to have been less sudden in its incidence." The Indians of Alaska were reported ^{June 20} as dying in large numbers during the past year. In Austria 2823 deaths from influenza were reported ^{May 22} during the epidemics of 1889 and 1890; 930,478 applied for medical relief, but of course a large number did not call in a medical attendant. Lee ^{Jan. 24; Mar. 14} reports 1,120,000 cases in Pennsylvania during the recent epidemic, of which 7880, or 1 in every 142, died.

Symptomatology.—Arcularius ¹⁵⁰ alludes to the preponderance of cases in which general prostration was complained of over those in which the more localized neuroses occurred. The absence of catarrh of the air-passages and of gastric disturbance, after the subsidence of the fever, was noted. James Mackenzie ⁹⁰ refers to the throat symptoms (inflammation of the fauces, with purulent exudation from the follicles of the tonsils) in the early cases of an epidemic at Burnley in April and May. He also alludes to the disproportion between the degree of febrile disturbance and the sensation of chilliness and heat, these sensations being extremely marked when the temperature was raised but a degree or two. Squire ⁶ calls attention to the occurrence of tonsillitis with the fever, having an average duration of four days and appearing as a prominent symptom. Thompson, ⁸¹ in describing the influenza as it prevailed in Northern Texas, alludes to an abdominal variety, the attack beginning with great pain in the abdomen, relieved only by large doses of morphine. Crendiopoulos ⁸⁷ refers to several cases of an intermittent form, in which the morning remissions, ordinarily observed in the course of the disease, were unusually marked. Weber ¹⁵⁰ has observed the frequent occurrence of delirium and typhoid symptoms, also neuralgic and rheumatic disturbances, as sequelæ. In 2 cases he encountered deafness, with sudden rupture of the tympanum, after persistent congestion and pain in the side of the head corresponding to the affected ear. Clevenger ⁷⁰⁰ reports a case in which the patient, a Swedish sailor, developed symptoms of inco-ordination and paraplegia. Nystagmus and tremor of intention were present, so that the case resembled one of multiple cerebro-spinal sclerosis. Convalescence was attended by protracted exhaustion, but recovery

ultimately ensued. Clevenger cites a similar instance observed by Landon Carter Gray. Gwynne ^{Aug. 25}₁₉₁₈ found that the temperature in uncomplicated cases usually ranged from 100° to 103° F. (37.8° to 39.5° C.), the mean being from 101° to 102° F. (38.3° to 38.9° C.).

Pulmonary Complications.—Acute bronchitis, according to Bruce, ⁶_{May 20} is a common complication of influenza in the present epidemic,—more common than in 1890. It may be an early symptom, or so late as to be called a sequela, or at any rate to be attended with a recrudescence rather than a relapse of the fever. There may be more or less objective dyspnœa, until, in the worst cases, the patient sits up, gasping for breath, and finally may perish of asphyxia. Occasionally, bronchitis drifts into broncho-pneumonia, patches of consolidation developing over the lower lobes posteriorly, with crisp râles, bronchial breathing, and bronchophony. As far as his experience goes, there are three differentiated types or varieties of pulmonary inflammation in connection with influenza. The first is an ordinary well-developed acute croupous pneumonia; the second is a very curious ill-developed pneumonia, popularly called "congestion," apparently croupous pneumonia in the stage of engorgement, where the exudation never becomes completely solid; and the third, broncho-pneumonia following bronchitis.

Morehouse ²⁵⁷_{Mar.} states that inflammation of the lungs was usually fatal in his practice when it occurred as a complication or followed an attack of influenza. Catarrhal pneumonia was the form most usually encountered, and it appeared to be a gradual and insidious extension from the tubes to the air-cells; but the most fatal and distressing form was pleuro-pneumonia, coming on with violent and distressing pain at the very onset, the patient appearing to be stricken from the beginning, as though from collapse. Ornstein ⁶⁰_{Nov. 27, 1918} maintains, in opposition to those who hold that every pulmonary complication, as capillary bronchitis, lobar pneumonia, and catarrhal pneumonia, are consequences of the more or less energetically active poison, that the infecting agent, through its depressing effect upon the nervous system, influences the resisting-power of the organism to the heterogeneous sources of infection that may be present. Crendiopoulos ⁸⁷_{Sept.} has recorded the case of a farmer 30 years old, in whom an attack of influenza

was followed by the development of symptoms and physical signs of pneumonia, on the twelfth day of which pain in the right hypochondrium was superadded. The area of hepatic percussion dullness became increased; febrile movement persisted, and profuse sweating, with irregular chills, occurred; emaciation progressed, and the patient died. At the autopsy, in addition to hepatization of the lung, a large abscess of the liver, containing about 1 quart (1 litre) of pus, was found. It is believed that the attack of influenza was followed by an invasion of pneumococci, with the development of pneumonia, subsequent lodgment in the liver giving rise to the formation of the abscess found after death.

Intestinal Complications.—The digestive organs, according to Nicholson,⁶⁹ _{Mar. 19} are frequently affected. Vomiting is often present, especially in the commencement. Diarrhœas occur in 8 or 10 per cent. Atonic dyspepsia, from which the patient may have been free for years, is often revived. The occurrence of diarrhœa, accompanied with fermentation and flatulence, has been noted by Patton.¹⁹ _{May 23} This form of diarrhœa has also been an accompaniment of pneumonia during the past epidemic.

Genito-Urinary Complications.—Currie¹⁹⁹ _{Aug.} reports that he has repeatedly observed orchitis accompanying influenza. Both testicles are usually affected, and are very painful. Frazer⁶ _{June 27} reports a case of influenza complicated by acute nephritis. A bacteriological examination was made, in the expectation of finding the pneumococcus which had been found in the urine of influenza patients by Jollés.

Mental and Nervous Complications.—Kirn⁵⁷ _{Aug. 16} divides the mental disturbances incidental to influenza into two groups: (1) those occurring in the febrile stadium of the disease, namely, the so-called febrile delirium and the more protracted febrile psychoses; (2) those appearing after the subsidence of the fever, namely, the asthenic psychoses, present sometimes in the form of melancholia and sometimes in the form of mania, the former of these two predominating. He considers the cases of paralytic and hysterical psychoses, as well as those of paranoia, as incidences of primary affection which have become manifest during an attack of influenza or as the result of such an attack. He looks upon the exciting cause of all of these affections as a product of infec-

tion,—a toxine,—influencing the nervous system conjointly with the fever or in the presence of psychic predisposition.

Schmitz²⁹⁵,_{B.C.H.Z.4} has reported 8 cases in which psychoses developed. In all, symptoms of melancholia predominated. He considers the prognosis generally favorable. Richardson⁶,_{May 16} has recorded 2 cases of acute mania in the course of influenza. One occurred in a girl 15 years old, of whom the father had presented melancholic tendencies and a paternal aunt had been insane, while an elder sister had had an attack of acute mania, from which she had recovered, and a second sister had had an attack of melancholia, in which she died. The second case occurred in a woman 30 years old, without hereditary taint, who had suffered anxiety and grief in consequence of the illness and death of a child. In both cases improvement took place. Railton⁶,_{Oct. 10} has recorded the case of a girl 6 years old, without neurotic or psychotic family history, in whom hysteria developed after an attack of influenza, in the course of which consciousness was lost for ten days. During convalescence it was observed that the girl made no attempt to walk or to talk. She was conscious, but apathetic. When the hands were extended they were involved in tonic spasm. The girl cried a great deal, with a laryngeal whine. She was quite insensitive to the pricks of a pin. When lifted out of bed and held up under the arms, she held the lower extremities at right angles to the trunk until compelled by physical exhaustion to allow them to fall. There were no evidences of organic disease.

Bristowe²,_{July 4}, reports 2 cases of abscess of the brain. In the first the attack occurred, the usual symptoms of malaise and myalgia existing in a marked degree, followed by severe pain in the back of the right thigh. The subsequent train of symptoms was as follows: convulsions, pain and throbbing in the head, right hemiplegia, and coma, ending in death. The autopsy disclosed the existence of an abscess the size of a small orange in the left hemisphere, occupying the posterior and upper part of the frontal lobe and the adjoining part of the parietal lobe. In the second case, in a girl of 14, the headache, which had been present in the acute stage of the attack, persisted during convalescence, growing more and more intense, and becoming complicated by uncontrollable vomiting. These symptoms, unaccompanied by delirium or convulsions, continued until death, which occurred on the nineteenth

day from the beginning of the attack. An abscess the size of a small orange occupied the right occipital lobe. In neither of these cases were the ears diseased, and there was no condition present to explain the origin of the abscesses. Bell ⁵⁶ _{Apr.} has reported a case of neurosis of the pneumogastric nerve, with annoying salivation, a sense of fullness and pressure in the stomach, with pain, palpitation, and difficulty in breathing. Multiple neuritis after influenza is reported by Westphal ⁶ _{Jan. 10}. Two cases are described. In one the first symptoms were manifest seven days after the beginning of the disease. The first patient was 29 years old. He complained first of a feeling of numbness and pain in his toes and fingers, subsequently of weakness of the limbs and difficulty of swallowing, abolition of the knee-jerk and the triceps-jerk, retention of the abdominal and the plantar reflexes, with slight paralysis of the right side of the face. Under appropriate treatment symptoms promptly disappeared, but the knee-jerk remained absent for several months. The symptoms in the second case were more severe, and were ushered in by an attack of urticaria. In the course of a few weeks there was general muscular weakness, paralysis of one side of the face and paresis of the other, difficulty in swallowing and abolition of the knee-jerk, pain on pressure over the affected nerve-trunks, and wasting of muscles both in the upper and lower extremities, the reaction of degeneration being preceded by an increased electrical irritability. Two similar cases are reported by Homen ⁵⁴ _{Nov. 9; May 9} ⁶ as occurring in brothers. King ⁶ _{Jan. 11} mentions a case in which extreme head-pain, with acute vomiting and constipation, was followed by squint, dilated pupils, stupor, and an epileptic attack. All passed off, and the boy is now quite well. In 1 case, a semi-cataleptic condition occurred. Colley ⁶² _{Jan. 11} reports a case of Basedow's disease as a sequel. A case of attempted suicide during an attack of influenza has been reported by Creagh. ⁶ _{July 11} The patient was suffering from the pulmonary form of the disease, and was seized with the maniacal impulse while his temperature was only 101.5° F. (38.6° C.).

Aural Complications.—Joly ³⁷ _{Apr.} calls attention to the unusual frequency of ear affections during the recent epidemic, and mentions the occurrence of haemorrhage as a frequent symptom, accompanied and followed by violent pain. Lee ¹⁸⁷ _{July} states that a catarrhal inflammation affects the auditory structures, beginning usually at

the pharyngeal opening of the Eustachian tube, and rapidly passing up that canal into the cavity of the tympanum, where, in most cases at least, its pernicious energy is spent on the tympanic membrane, and does not pass to the important adjacent structures. He has seen no case in which the inflammatory process extended into the labyrinth, the early rupture of the drum aiding in averting such an accident. Ménière ³⁷ _{Sept. 1 Feb.} states that aural complications are the result of retronal affections. Of 57 cases, 23 lasted four or five weeks. In 11 cases the lesion was unilateral, in 17 bilateral. In another series of 16 cases, 9 were unilateral and 7 bilateral, and the duration of the disease three months. Eight lasted four months, and 5 were still under treatment because of complications, as periostitis and mastoid inflammations. Ludwig ³²⁸ _{Sept. 90} found otitis subsequent to influenza sometimes a malignant and life-threatening disease, which, in conjunction with pyæmia and meningitis from empyema of the frontal sinuses, presents the most frequent cause of death after pneumonia.

Ocular Complications.—Ingals ⁶¹ _{Oct. 10} observed inflammation of the cornea as a complication, usually confined to one side, and of two types: one, in which a zigzag line of superficial ulceration appeared at some point at the periphery of the cornea and traveled toward the centre; another, in which the surface of the cornea showed no disturbance, but in which focal illumination revealed small, round, grayish spots, localized in the deeper layer of the epithelium. In these cases the conjunctiva, although affected, did not show the characteristic zone of intense hyperæmia around the cornea. Macnamara ⁸² _{Sept. 18} has met 4 cases of optic neuritis, 3 in males. Five cases of retro-ocular neuritis are reported by Éperon. ⁵⁹ _{June 18} Three cases of ocular complications are reported by Ray, ²²⁴ _{July 4} and Hausen ¹³ _{Sept. 2} describes a case of acute retrobulbar neuritis. Lai-bach ¹³ _{Mar.} reports the case of a young lady, who suffered from influenza with severe hemicrania dextra, whose eyelashes on the right eyelids turned perfectly white. Tenonitis following influenza is reported in 4 instances by Fuchs. ⁸ _{No. 11, '90}; ⁵ _{Jan.} In 2 of the cases the pneumococcus of Fraenkel-Weichselbaum was found in cultivations made from the secretions. One case went on to suppuration.

Miscellaneous Complications.—Cazaux ³⁵ _{June 10} has recorded a case of laryngeal paresis affecting the posterior crico-arytenoid muscles. Mijulieff ¹³² noted that, in women menstruating during an attack of

influenza, the flow was more profuse and prolonged. In a case of amenorrhœa the flow re-appeared after an absence of four months; in another it appeared for the first time during an attack. The increased flow must be explained as due either to an acute endometritis or to the presence of pathogenetic micro-organisms in the blood introduced through the respiratory tract. These give rise to certain vasomotor disturbances, which may lead to haemorrhages in other organs besides the uterus. It is possible that the microbes may generate ptomaines, which exert a direct irritant action upon the vasomotor system. Gibson ^{June 12}² has reported several cases of hyperpyrexia in the course of influenza. One occurred in a man, in whom the temperature rose as high as 108.4° F. (42.3° C.). Despite energetic antipyretic treatment, including baths and acetanilid, the man died, unconscious. Another case occurred in a woman, 21 years old, recently delivered of a child. The temperature rose to 108° F. (42.2° C.); it was but little influenced by antipyrin, acetanilid, or quinine, and only temporarily by cold baths. Death took place, the temperature being 107.4° F. (41.8° C.). In an infant, 3½ months old, with influenza, the temperature rose to 105° F. (40.6° C.), but was reduced by cold bathing, with ultimate recovery. Two cases of apyrexial influenza are reported by Godfrey. ^{July 24}³ In both cases the patients were suddenly seized with marked nervous symptoms, delirium and pain in the head being ~~the~~ the most prominent, in addition to the subnormal temperature ~~out~~ range.

Johannsen ²¹_{no 46, 90} has recorded a case of gangrene of the foot during the course of an attack of influenza complicated by acute nephritis. Upon amputation, the arteries were found occluded by thrombi. Johannsen also observed phlegmasia alba dolens, in a girl of 15 years, during an attack of influenza. Influenza in children presented but few complications, ¹⁵⁰_{say}, the most frequent appearing to be general swelling of the lymph-glands, notably cervical, the axillary and inguinal glands, after the subsidence of the fever. This swelling was not painful, and in no instance did it progress to suppuration. In most cases it disappeared in from one to three weeks, the disappearance of the swelling being often accompanied by a slight rise in temperature incident to the process of resorption. In all of the cases enlargement of the spleen was observed. The writer considers this occurrence as illustrating a special localizat-

tion of the infecting principle. Fiessinger ⁵⁵ _{Sept. 12} reports a case of acute infectious endocarditis, complicating influenza, in a child of 4 years, who, after the acute symptoms characteristic of influenza, suffered from fever that continued without remission for sixteen days. On the seventeenth day a harsh, systolic murmur was detected over the apex. This was followed by intermittent pulse, cyanosis, and death on the twenty-fourth day.

Sequelæ.—Neuralgia has been observed by Adler ¹⁵⁰ _{May 15} to be the most frequent sequela, especially in children. The following nerves were affected in the order of frequency: (1) trigeminal; (2) sciatic; (3) intercostal. In one case he observed intercostal neuralgia with herpes. Subacute rheumatism appeared to attack the smaller joints. Moyer ²⁰² _{Aug. 25} has not, in any instance, found that influenza is responsible for nervous affections comparable in severity to those following diphtheria or the exanthemata. He concludes that influenza is not a microbic disease, but due to prevalent meteorological conditions. Brosset ²¹¹ _{Mar. 11} presents the notes of a case of multiple neuritis following influenza. The commencement of the disease in the peripheral nerves leads him to conclude that the affection is not of central origin. He rejects the possibility of the disease being a result of rheumatism. Priester ⁸⁴ _{July 4} describes a case of nona following influenza. One month after a slight attack the patient began to suffer from severe pain in the occipital region and in the back of the neck. This was soon followed by somnolence, but was unaccompanied by disturbances of motility or sensibility. It became more and more difficult to rouse the patient. Recovery gradually took place, convalescence beginning in the sixth week after the accession of the attack. In a discussion of the affection called nona, Ebstein ⁵⁷ _{Oct. 18} reported the case of a woman, 53 years old, who, while under treatment for digestive derangement, suddenly became delirious and subsequently soporose. The attack was repeated a second and a third time, the patient not awakening from the last. At the autopsy there was found no evidence of a cerebral lesion. The intestines and the spleen presented appearances characteristic of an infectious disease. Although the patient gave no history of influenza, it is possible that nona represents an infectious sequel of unrecognized influenza. Jolly ⁶⁹ _{Mer.} summarizes the results of a study of the psychic disturbances following influenza, with a view to ascertaining the causal

relation of the disease to the symptoms observed by him. He concludes that we are right in assuming that influenza is responsible for none of the cases of true psychoses, inasmuch as in 104 cases he found only 21 in which neither hereditary tendencies nor alcoholism nor neurotic temperament were absent.

Prophylaxis.—Manby⁶ _{May 16} advises isolation in the prophylactic treatment of influenza. He says: "Hitherto we have relegated influenza to the limbo of diseases impossible to be dealt with by isolation, and with no attempt to minimize the quantity of poison diffused. Even while not attempting to isolate measles and whooping-cough on a large scale, we still often succeed in preventing their spread within the narrow limits of a dwelling, and by so much limit their further spread."

Prophylaxis has been successfully carried out by Gilbert⁶ _{June 20} by the use of quinine and arsenic. He used these remedies in a number of patients, none of whom were attacked. He observed one instance where 9 children in one family were attacked, and 1, who was taking arsenic for a skin affection, escaped. He thinks it reasonable to suppose that these two powerful antiseptics might prove inimical to the development of the microbe which probably causes influenza. It is also reasonable to expect that these drugs would fortify the system against the disease.

Goldschmidt⁴ _{Dec. 8, '90} observed a marked immunity from influenza among the inhabitants of Madeira who had been recently vaccinated. Owing to the outbreak of variola, many of the inhabitants were vaccinated; in the epidemic of influenza those that had been vaccinated remained free, while those that had not been vaccinated were rapidly infected. Goldschmidt suggests this fact as an explanation of the comparative infrequency of influenza among children. In confutation, Bienfait⁵⁷⁷ _{Apr.} has presented a series of cases among the employés of the railroads centring in Reims. He shows that, of 241 cases of influenza, 86 had recently been vaccinated.

Treatment.—Wallian⁹ _{Apr. 25} considers an efficiently managed Turkish or Turko-Russian bath at the onset one of the promptest measures at command. It relieves congestion, causes rapid elimination, and equalizes the circulation. Few patients are too weak to bear this measure. The sick-room should be free from curtains, plush furniture, etc.; should be large, airy, and should be perfectly disinfected.

fected with peroxide of hydrogen, which should be thoroughly sprayed about the room every two or three hours. It not only disinfects, but liberates free oxygen in an extremely active or ozonized condition. Add to this free and frequent inhalations of pure oxygen to the extent of 15 to 25 gallons (60 to 100 litres) per day.

The treatment of influenza neuralgia by sweat-baths is discussed by Frey.⁶⁹ Mar. 19 He used simply steam- or hot-air baths, and found the best results in the ordinary typical forms of neuralgia and in recent cases. He explains the good effects by the increase in the body-temperature and in the force of the circulation, as a result of which oxidation is increased to such a degree that the micro-organisms in the blood are deprived of their proper nutriment, and are affected by the increase of carbonic acid.

Weber¹⁵⁰ relied upon rest and expectant treatment to avoid complications. Thompson⁸¹ Aug. states that quinine sulphate has no apparent effect in modifying the course of an uncomplicated attack. Ingals,⁶¹ on the contrary, found that quinine had a decided effect in relieving the neuralgic symptoms. Kinsman²²² Aug. has reported a case of influenza, complicated with hydrothorax and general dropsy, in which the fatal result was precipitated by the excessive use of antipyrin. The depression following the acute attack of the disease is in part attributed by Patton¹⁹ May 25 to the administration of large doses of antipyrin, phenacetin, and antifebrin, and the exhaustion following the last epidemic (notably more marked than in the epidemic of 1889-90) to be due to the increased use of these remedies. In the treatment of diarrhoea in influenza salol proved useful in his hands; for gastric fermentation, thymic acid, $\frac{1}{2}$ grain (0.032 gramme), and charcoal, 5 grains (0.32 gramme).

Bigelow¹²¹ May recommends a mixture of antipyrin and salicylic acid, to be followed by a pill containing iron and *nux vomica*. Childs²⁰⁷ Feb. reports a case in which acetanilid had been given in doses of 25, 15, and 10 grains (1.62, 0.97, 0.65 gramme), respectively, within twenty-four hours, with toxic effect,—cyanosis, syncope, subnormal temperature, and excitement. Marotte⁷⁰ June 21 has found ammonium chloride superior to quinine in the pulmonary form, and strongly recommends its use. The employment of camphor as a general sedative has been advocated by Long.² Aug. 29 Stillwell⁷⁷⁹ July expresses his opinion in favor of opium, 1 grain (0.065 gramme),

or morphine, $\frac{1}{2}$ grain (0.011 grammie), administered at the onset of the attack, together with the use of a warm bath; these measures to be followed by a mild cathartic, preferably calomel. Turner,⁶ advocates the administration of large doses of salicin, 20 grains (1.3 grammes), every hour. Johnson¹⁷⁶ reports rapid relief from the headache and the general nervous and digestive symptoms from the employment of copper arsenite in doses of $\frac{1}{100}$ grain (0.00065 grammie).

The following prescription is very highly recommended by Palmer¹⁸⁰ ~~Aug. 10~~:

R Salol,	Dijj (3.89 grammes).
Phenacetin,	Dij (2.59 grammes).
Quininæ salicylat.,	Dij (1.3 grammes).
M. et flat caps. no xx.	

Sig. : One every three hours.

Emerson¹⁸⁰ has found nothing better as an antipyretic and ~~analgesic~~ than phenacetin, or phenacetin and salol in combination. He gave 10 grains (0.65 grammie) of phenacetin, or ~~5~~ 5 grains (0.32 grammie) of phenacetin and 5 grains of salol, or ~~2.5~~ 5 grains (0.16 grammie) each, every three hours, for a day. It ~~is~~ is rarely necessary after that time.

Phenacetin is warmly recommended by Clemow,² who ~~has~~ has used it in from 4 to 10 grains (0.26 to 0.65 grammie). The ~~the~~ second dose is given an hour after the first, and repeated every ~~every~~ four hours if the patient is not relieved. Similar results are reported by Henry.² Laffont⁵⁹ ~~Apr. 11~~ advises, as a rational treatment, gentle fumigations, diaphoretics and revulsives, and strong tonics.

That influenza is a paresis, or partial paralysis of the pneumogastric nerve, depending probably on such a sudden change in the atmosphere as involves an increased expenditure of force in maintaining circulation and respiration, is the idea advanced by Morris.⁶¹ Hence follow the phenomena of heart-failure and pulmonary congestion, gastro-intestinal troubles, or intense neuralgias. He finds, as a logical sequence, that the best remedies are strong excito-motor stimulants, chief among them strychnine, caffeine, alcohol, and ammonia. Since he has treated his patients with 5- to 10-drop doses of tincture of nux vomica every three or four hours, he has often been surprised at the promptness and almost unfailing success of the method. In otitis with serous exudation Michael, of Hamburg,³⁷ thinks paracentesis useless or

injurious, but Politzer ³⁷ maintains the opposite view. Johnston ³⁸ coincides with the opinion of the latter.

The experiences of the year have but confirmed the fears felt as to the danger of using the more powerful coal-tar antipyretics and analgesics in efficient doses. The only member of this group that has in any degree earned the confidence of the profession is phenacetin used in moderate doses. Upon the basis of the infectious nature of the disease, with its concomitant and profound intoxication, a most important, as the most logical, feature of treatment is the use of eliminative measures, acting especially upon skin, kidneys, and bowels. The complications and sequelæ have occasioned serious concern on account both of their gravity and their long continuance. In this connection the circulatory, respiratory, and nervous systems have suffered the most severely.

INFLUENZA.

(From the ANNUAL for 1893.)

Etiology and Bacteriology.—Pfeiffer ⁵⁷ describes bacilli found in pure culture in the bronchial secretion of uncomplicated cases of influenza. They were frequently present in the protoplasm of pus-cells in great numbers. They were absent from the sputum of ordinary bronchial catarrh, pneumonia, and pulmonary tuberculosis. They may be stained by means of a warm solution of methylene-blue prepared according to the method of Loeffler, and by a weak Ziehl solution, and do not stain by Gram's method. The bacilli can be cultivated in agar-agar, but inoculations and further cultures are without effect excepting in the case of apes and rabbits. The bacilli are small, encapsulated, and often found disposed in rows lying end to end. The extremities are more deeply stained than the intervening portion. Weichselbaum has ⁸ not been able to detect the deeper staining of the extremities of the bacilli. He ascribes the appearance described by Pfeiffer to the proximity of two of the minute bacilli, which gives the impression of a small diplococcus. He, however, agrees with Pfeiffer ^{Aug. 18} in his results as to cultures of the bacilli. Experiments with glycerin-agar, sugar-agar, animal broths, and blood-serum were unsuccessful. When, however, Pfeiffer's later method was followed, namely, the coating over of the surface of any one of the albuminous media with blood, the cultures were successful, even to late generations. In the examination of tissues Weichselbaum was able to obtain striking results, the only precaution necessary being to decolorize the sections until the protoplasm of the cells became almost colorless. Alkaline methylene-blue and carbol-fuchsin were the agents used. The examination of the blood was negative. He asserts that the virus of influenza ~~is~~ is more prone to produce lobar pneumonia than other pulmonary ~~affections~~ affections.

Pfeiffer and Beck, ⁵⁹ in their later investigations, have noted the pathological appearances of the lung in the pneumonia of influenza. Areas of broncho-pneumonia coalesce to form larger areas of consolidation, although general hepatization is absent. In the centre of such patches, on section, a yellowish-green, purulent

secretion may be expressed from the smaller bronchi. This secretion consists of pus-cells and mucus, and in it can be found the typical bacilli, sometimes free, sometimes within the cells. It was not possible to detect the bacteria in the blood. The bacilli are aërobic and are destroyed by drying. They are killed in five minutes by a temperature of 60° C. (140° F.). It is possible to produce, in apes, a condition similar to influenza in man by placing a little of the pure culture upon the mucous membrane of the nose.

Canon⁵⁹ found the specific bacillus present in the blood from twenty-four consecutive cases of influenza. The drop of blood, taken from the patient's finger, was brought in contact with a thin cover-glass, over which another was laid, both being suddenly pulled apart. The cover-glasses, after drying, were placed in absolute alcohol for five minutes; they were next placed in a coloring solution of the following composition:—

Concentrated aqueous solution of methylene blue,	40 parts.
Alcoholic solution of eosin (5 to 1000),	20 parts.
Water,	40 parts.

The specimens remained in this solution for from three to six hours at 36° C. (96.8° F.), and were then washed in water. In six cases Canon found the bacilli in preparations of blood in numerous large groups containing from three to fifty bacilli each. The blood was obtained in these six cases during the pyrexial stage or shortly after its decline. In three of the cases there was no further rise in temperature, and in six days no bacilli were to be found.

Kitasato⁵⁷ attributes the difficulty experienced by most observers in developing cultures of the bacilli found in the sputum to the contamination from the cavity of the mouth. The organisms of the mouth develop rapidly in artificial media and conceal the colonies of the specific bacterium, especially as the latter develops slowly. He calls attention to the possibility of recognizing the influenza bacilli by their proclivity to form in colonies that develop separately and never coalesce, a characteristic wanting in all other known forms of bacteria.

Babes, of Bucharest,⁶⁰ during the epidemic of 1889-90, isolated from the sputum of influenza patients a bacterium that presented the following characteristics: It was found in fresh cases

in unlimited numbers in the sputum and within the protoplasm of the leucocytes, forming a thick deposit upon the mucous membrane and penetrating within the lymph-spaces. This bacterium appeared in pairs, or as a short bacillus of 0.2μ in diameter, disposed in short chains. The bacilli were surrounded by a transparent zone and were non-motile. In old specimens and cultures and in the interior of leucocytes they were found in a condition of granular disintegration, sometimes smaller than usual and sometimes swollen to three times their usual size. It was possible to cultivate them in agar-agar and, by inoculation in rabbits, to produce a form of septic infection and a fatal pneumonia.

Cornil and Chantemesse¹⁰⁰ _{Feb. 11} found that, twenty-four hours after inoculating a rabbit with blood from a child suffering from influenza, there were present in the blood of the rabbit bacilli that responded to the special method of staining. The organisms had a diameter of about one-twentieth of that of a red corpuscle. In cultures in sweetened gelose a transparent, opaline zone developed in twenty-four hours, presenting a finely granular appearance.

Pfuhl,⁵⁰ _{Mar. 26} in nine cases of influenza, found the same organism in great numbers in the sputum, both outside of the cells and within them. As the fever subsided the number of bacteria apparently diminished. They stained according to the method described by Pfeiffer, and were cultivated to the eighth generation in broth from colonies on plate-cultures of glycerin-agar inoculated with sputum. In plate-cultures from the blood of one case a bacillus similar to that found in the sputum, but more delicate in form, was found by him. This bacillus was cultivated to the second generation. Rabbits inoculated with both bacilli from the sputum and bacilli from the blood showed signs of infection, but the first variety produced the most marked results.

F. J. Thornbury, of New York, ⁵⁹ _{June 4}, describes the bacillus of influenza as being one-half the length of the "septicæmia bacillus" and of equal thickness. It is best cultivated in sugar agar (1½ per cent.), and is virulent to the fifteenth generation. The colonies appear as minute, watery drops along the streak of inoculation. In bouillon the bacillus grows scantily, and gives evidence of its non-motility by the fluid remaining clear. It cannot be cultivated in gelatin, because gelatin melts at the temperature necessary for the growth of the organism.

Incidence.—Ruhemann, of Berlin, ⁶⁹ Nov. 30, 1891 observed several sporadic cases of influenza early in September, 1891, in Berlin, and considers these as marking the beginning of the epidemic in that city for 1891–92. The disease appeared to attack women and children to a greater extent than in former epidemics.

Roberts ⁶ _{Sept. 23} calls attention to the relation of influenza to meteorologic conditions, as shown in a series of meteorologic tables issued by the borough of Nottingham. These show that during the epidemic of ten weeks the barometric pressure was high, with a low and narrow range of temperature and a corresponding absence of rain and sunshine during the seven weeks preceding the outbreak of influenza. During the prevalence there was nothing remarkable in the climatic conditions, except an extreme range of temperature from a maximum of 72° F. (22.2° C.) to a minimum of 29° F. (–1.66° C.) during the period of the maximum death-rate from influenza and respiratory diseases. There was nothing unusual in the atmospheric pressure, rain-fall, or direction of the wind during the ten weeks in which deaths from influenza were recorded. From these tables, it also appears that the number of deaths from zymotic diseases was proportionately smaller as the epidemic increased, and that the number of deaths from diseases of the respiratory apparatus and in the old followed the course of the epidemic. The majority of writers place the period of incubation between two and six days. Kochmann, of Abenberg, ⁶ June 11 has mentioned twelve hours as the shortest period, while Hennig, of Leipzig, ⁶ June 11 has observed a case in which seventeen days intervened between the time of exposure and the onset of the attack. A. Alison ¹⁵² _{Sept. 29} reports a series of cases illustrative of the contagiousness of influenza. He observed that the disease spread in three ways: (1) directly by contact; (2) indirectly by means of the atmosphere vitiated by exhalations from influenza cases; and (3) by objects that had been in contact with infected individuals. He states that the principal means by which the germs find entrance into the body is the mucous membrane of the respiratory and digestive tracts; possibly, also, by the vaginal and the conjunctival mucous membranes. R. Sisley ²⁶ _{Sept. 1} records two instances of the spread of influenza from horses to attendants that had been in contact with the infected animals. He admits that, while such a mode of transmission is possible, it is not usual. He alludes, also, to the generally-accepted belief that

influenza among domestic animals is contagious from one animal to another. Ruhemann, of Berlin,²⁰⁷¹ _{p. 110} inclines to the doctrine of contagion. He gives his own experience among 55 families, numbering 193 individuals. In 1889-90 there were 64 cases of influenza among this group, while in 1891-92 only 40 were attacked; and, what is of special interest, only 5 out of this number were affected (and that but slightly) two years before, while of the 64 then attacked only 4 again became victims. That one individual may suffer several recurrences during the prevalence of a single epidemic is not thought to militate against the general doctrine of protection, as many such recurrences may be explained by lack of caution on the part of patients against exposing themselves to fresh infection before they are fully restored to health.

Pathology and Morbid Anatomy.—Althaus, of London,⁶ _{p. 11} refers to the results of a series of eleven post-mortem examinations made by Helweg. In every case intense hyperæmia of the pia mater at the base of the brain was present. The arteries were distended and the consistence of the brain and spinal cord was increased. It is believed that this hyperæmia is more than an evidence of a vasomotor disturbance, and that it points to the natural association between influenza and epidemic cerebro-spinal meningitis. This theory is suggested by the occurrence, in a large proportion of the cases, of pachymeningitis and leptomeningitis.

Ribbert, of Bonn,⁶ _{p. 11} in describing the lesions of the ~~the~~ respiratory tract, points out that the forms of pneumonia that ~~the~~ ~~the~~ accompany or follow influenza are somewhat varied. Often there is ~~the~~ lobar pneumonia, in which the hepatization has, on section, ~~the~~ a peculiar, smooth aspect, differing from the granular appearance of ~~the~~ ordinary croupous pneumonia; or this condition may be com- ~~the~~ mingled with areas of lobular hepatization; or the latter may alone ~~the~~ be present. Again, in some cases, there is marked interstitial in- ~~the~~flammation; a character that may account for the greater tendency ~~the~~ to the supervention of abscess and pulmonary gangrene observed ~~the~~ in influenza cases. Pleurisy is a frequent concomitant; while peri-~~the~~ carditis and, sometimes, myocarditis have also been observed. The ~~the~~ spleen is usually enlarged. There may be cloudy swelling of the ~~the~~ kidneys, or even glomerulo-nephritis. Cerebro-spinal meningitis and cerebral abscess have been met with. The chief feature of the

morbid anatomy of influenza, however, is the inflammation of the respiratory organs, to which the mortality is mainly due.

Symptomatology and Diagnosis.—Hughes, of St. Louis, ⁹⁸ _{Apr.} has observed a prolonged congestion of the vessels of the cerebro-spinal system among the salient features of the involvement of the nervous system in influenza. Early in the course of the disease, two-thirds of the cases in females exhibited spinal tenderness, while in males one-third presented the same symptom; the disease, therefore, is evidently not limited in its incidence to the medulla oblongata. Zenner, of Cincinnati, ⁵³ _{Jan. 16} states that the mental symptoms of the febrile period are more likely to appear on the second or third day of the disease. They are mostly like those of the ordinary delirium of fever,—a semi-conscious, dream-like state, and a sense of restlessness, indicated by tossing about, screaming, singing, etc. There is usually disturbed sleep, and often the indications of hallucinations and delusions, and perhaps of an anxious, depressed mental state. The delirium may be of only a few hours' or of a few days' duration, but frequently it lasts a few weeks after all other symptoms have passed away, and may pass into the form of post-febrile insanity. Usually there is partial or complete amnesia of the attack. The prognosis of the nervous manifestations is generally favorable. The post-febrile psychoses may be of only one week's or of two weeks' duration, or even shorter, but they have an average duration of six or eight weeks, and sometimes continue for months. Rarely, cases do not manifest any tendency to recovery. Occasionally, a fatal termination ensues from exhaustion. Suicide sometimes abruptly terminates the clinical history.

Delmis ¹⁰⁰ _{Jan. 25} has observed praecordial distress, trembling of the muscles, vertigo, disorders of sight and hearing, even when the catarrhal inflammation has not extended to the conjunctiva or to the tympanum by the Eustachian tube. Otalgia, as well as other forms of neuralgia, especially those affecting the ophthalmic branch of the trigeminal nerve, is of frequent occurrence. Hyperæsthesia and insomnia are common symptoms. It is held that the terms "encephalic form" and "nervous form" are unnecessary, as the symptoms included by them are common to almost every case.

Nevins ⁸ _{Apr. 16} attaches much importance to the affection of the naso-pharyngeal mucous membrane in influenza. He believes that, as a rule, the affection first attacks the mucous membrane, and

that the intense inflammation resulting therefrom accounts for the grave constitutional disturbance. In support of this theory, he cites the analogous mode of attack in diphtheria, and the intense cardiac and general enfeeblement that accompanies a hospital sore throat. Cooper, of Atlanta, Ga.,²⁰⁷ reports two or three cases of severe nasal congestion, with its characteristic symptoms, followed by marked relief upon the discharge of a large amount of secretion from the nasal and accessory cavities. This condition has also been observed by Glasgow, of St. Louis,³⁶⁴ _{Feb. 15} who mentions the great increase in the number of cases of suppuration of the antrum during the influenza epidemic; also, the great prevalence of purulent and sanguineo-purulent discharge from the nostrils.

Robinson, of New York,¹ _{Apr. 16} has observed the occurrence of severe and repeated attacks of epistaxis in the early stage of influenza, the haemorrhage being so severe as to call for repeated plugging of the nasal passages. In one case under his observation the patient bled profusely, although there had been no history of previous epistaxis or nasal catarrh. He also calls attention to the sudden and extensive swelling of the tonsils. He cites the case of a child, about 3 years of age, that presented enlarged tonsils, without any follicular deposit. The enlargement was quickly followed by abscess of one tonsil, and, twelve hours later, by perforation of the tympanic membrane of the opposite side. Both ears were the seat of active suppuration for several days. As in scarlatina and other febrile disorders, the perforation of the tympanum was preceded by relatively slight pain of short duration.

Morton, of St. Joseph, Mo.,⁵⁰⁸ _{June} mentions hoarseness as often making its appearance at the beginning of the attack and constituting the most prominent symptom. It has, on the other hand, made its appearance late in the attack, and has frequently been so pronounced at this stage as to delay convalescence. Hoarseness, occurring at this time, has frequently persisted for many days and weeks, and sometimes for months. Laryngeal examination reveals hyperæmia and thickening of the mucous membrane lining the larynx and covering the true cords. The epiglottis is usually congested, and the distended vessels are perceptible on the laryngeal surface. The adductors and abductors are in perfect condition, so that the cords are easily approximated or separated at will, thus excluding paresis. The mucous membrane afterward be-

comes dry, and cough results. The pharynx and naso-pharynx are coincidentally affected, though not to the same degree as the larynx.

Anders, of Philadelphia, ¹⁹ _{Mar. 19} has, in the course of attacks of influenza, encountered clinical conditions resembling those of acute rheumatism; but, in these instances, he has found very little, if any, disposition for the trouble to move from one joint to another, and, as a rule, there were no cardiac complications. He has, however, met with cases, although infrequently, in which, although the joint symptoms were absent, cardiac murmurs were present. He believes that these are not due to valvulitis, but to an altered condition of the blood.

Da Costa ⁹ _{Jan. 2} has observed, as one of the most curious features of the epidemic of 1891-92, the prevalence of cases that, at first glance, seem mild cases of rheumatic fever. The joints, especially the wrist-joints, were extremely painful, only very slightly swollen, and doubtfully redder than normal; with the pain, which was great, there was some tenderness. The temperature usually ranged between 100° and 103° F. (37.77° and 39.44° C.). The rapidity of the pulse which accompanied this manifestation disappeared, together with the short cardiac murmur that was present in most cases. These murmurs are not considered as the result of an endocarditis, but as functional in character. Herzog ¹⁵⁸ _{Mar. 11, 11, 12} states that, although in general the epidemic of 1891-92 was less intense among children than the preceding epidemic, the gastric symptoms which previously prevailed had been replaced by catarrhal symptoms of marked severity. Bronchial catarrh followed by pneumonia has been frequently observed.

A. Thompson, ⁶ _{Feb. 12} contrary to his experience among adults, observed that in children the bronchial catarrh was usually unaccompanied by broncho-pneumonia, and that capillary bronchitis was notably absent. Later in the course of the disease the cough assumed a paroxysmal type, and, as in pertussis, was followed by vomiting.

Fürbringer ³¹ _{Mar. 17} reports two cases in which death occurred, in the course of influenza, as a result of grave organic lesions of the cerebrum. In the first case the general symptoms were complicated by those indicative of some central nervous lesion: cephalgia, anaesthesia, and right hemiplegia, with convulsions of the

face and extremities. The symptoms of the second case were equally typical. In both cases the autopsy revealed capillary emboli and haemorrhagic foci in the lobes of both hemispheres, involving the white and gray substance. This observation coincides with the tendency to extravasation in various organs, notably the mesentery and the intestines. These conditions are accounted for by alterations both in the blood and in the vessel-walls.

Complications.—Huchard, of Paris, ¹⁹ speaks of the association of various microbes found in influenza, and considers that the troublesome and complex pathology of the disease is due to this fact. This association is particularly evident in the pneumonic form of the disease. There are thus congestive pneumonias, inflammatory pneumonias, and suppurative pneumonias; those produced by pneumococci and those caused by streptococci. In influenza the virulence of all micro-organisms seems raised to the highest degree. This fact explains the frequency of secondary infections giving rise to the various complications and sequelæ.

Rendu, of Paris, ¹⁷ has noted the insidious progress of influenzal pneumonia. There is at first no shortness of breath or expectoration; suppuration appears, however, very rapidly. Kebler ²⁶ mentions a peculiar symptom occurring in pneumonia complicating influenza. He states that he has frequently seen the disease begin with a distinct haemorrhage, to account for which he could find no evidence of any lesion in the lung. Fever and cough supervene in from six to twelve hours after the haemorrhage.

Guttmann ⁶⁹ has observed two cases of tachycardia in the course of influenza. One was in a male 40 years old; the attack occurred in five paroxysms, accompanied by dyspnoea, the frequency of the pulse reaching 120. The patient suffered from a relapse, in which the same symptoms appeared. In the second case—that of a woman of 28 years—the pulse reached 140, and continued at that rate for five days. Both patients recovered.

Lykke ⁶⁸ mentions several cases of mental and nervous diseases that were seriously complicated by influenza. Two patients that, after apoplectic attacks, had regained the full use of their limbs, became again paralyzed and imbecile after attacks of influenza. They recovered slowly, after a year or more. A patient suffering from a combination of posterior spinal sclerosis and

general paralysis became quite deranged mentally after an attack of influenza, but recovered; a similar result was observed in a tabetic patient. Judson Daland, of Philadelphia,¹¹² states that many cases of influenza might properly be included under the "nervous variety," presenting delirium, and at times more or less persistent hallucinations, double consciousness, etc. The severe pain in the extremities so frequently present is associated with more or less tenderness on pressure, justifying the suspicion of neuritis.

Curtin, of Philadelphia,¹²⁹ states that more deaths have resulted from meningitis than from heart-failure, in the course of influenza. Althaus⁶ writes: " *La grippe* also seems occasionally to revive an old syphilitic affection which has lain dormant in the system for years, and thus indirectly to give rise to certain diseases of the spinal cord, which are known to occur habitually on a syphilitic base."

Fiessinger⁵⁵ reviews the observations of Albespy upon the aural complications of influenza. The ear may be affected in any of its parts; subacute otitis is the most usual form of disease; the labyrinth is also a frequent seat of affection, the disease spreading from this centre to either the middle ear or to the mastoid cells. Albespy has reported two cases in which deafness followed labyrinthine disease. Clarke²⁴ states that, with the exception of the ordinary catarrhal ophthalmia present in many cases of influenza, the ocular troubles have been mostly due to a lowering of the vitality of the system, and hence might be classed as neurotic. The three commonest eye-complications have been: (1) conjunctivitis, generally appearing during the attack; (2) corneal ulceration, generally appearing at the end of the attack; (3) asthenopia, manifesting itself mostly during the convalescent stage. The conjunctivitis was accompanied by a good deal of photophobia, but not, as a rule, with much discharge. Phlyctenular and simple keratitis, kerato-iritis, and herpes of the cornea have all occurred, but simple ulcer has been the commonest affection. A severe case of iritis and cyclitis following influenza was observed. Affections of the more important regions of the eye, such as optic neuritis, optic atrophy, retinitis, glaucoma, etc., have all occurred, but have been rare. Paralysis of the intrinsic and extrinsic muscles of the eye occurred, reminding one of the same troubles

seen in diphtheria, and pointing to the presence of some poison in the blood. Asthenopia was the commonest complication. It sometimes showed itself during the attack, but chiefly during convalescence, or sometimes later. A large number of patients complained of eye-strain for the first time after an attack of influenza. These were mostly cases of premature presbyopia; others had no refractive defect, and their asthenopia was of the neuropathic type, allied to the neurasthenic asthenopia, and often manifesting itself in those recovering from a long illness. As a result of the lowering of nerve-force, which is such a characteristic symptom of influenza, the ciliary muscle is less able to stand fatigue, and, to avoid the asthenopia, many persons have been compelled to use glasses earlier than usual. Muscular asthenopia due to the strain of convergence figures prominently as a sequel of influenza; and retinal asthenopia, diagnosticated by the concentric contraction of the field of vision, has often been seen. The prognosis has been good; almost all of the cases, in time, have recovered. There has been no relation between the severity of the attack of influenza and the ocular trouble. The treatment consists chiefly in rest and tonics, the local trouble being treated by the usual remedies. For the asthenopia, weak, convex lenses should be ordered.

Max Thorner, of New York,¹⁵⁰ reports a case of influenza in which a deposit of *oïdium albicans* occurred in the nose and pharynx. The patient was a male, 17 years of age, who, during the latter part of an attack of influenza, was seized with profuse bleeding from the nose. He was prostrated by the loss of blood, and, during recovery from this sudden epistaxis, he began to complain of dryness and soreness of the mouth. An examination of the tonsils revealed a deposit similar to that occurring in follicular tonsillitis. This deposit spread, until it formed a pronounced membrane, covering the tonsils and pharynx. The nasal cavities finally became affected. It was evident that this membrane was of mycotic origin. Examination revealed the mycelium and spores of the *oïdium albicans*. The deposit, in its extension, involved the entrance to the Eustachian tubes, occasioning deafness and a sense of fullness and throbbing in the ear.

Pantzer, of Indianapolis,⁵⁶ reports a case of abdominal section for removal of the uterine appendages, in which the patient progressed without unfavorable symptoms until the seventh day,

when she was exposed to the contagion of influenza. On the ninth day there developed pain in the right side of the chest; dullness, affecting the lower and middle lobes of the right lung; severe cough, and rusty expectoration. The pulse was 127; the temperature, 104° F. (40° C.). Pneumonia was diagnosticated. At this time the open surface at the lower angle of the incision began to discharge pus. There were no pelvic symptoms, but the patient rapidly failed in strength, and death occurred from cardiac failure on the thirteenth day, after resolution in the lung had fairly begun. Corresponding with the improvement in the condition of the lungs, the amount of pus secreted by the wound lessened, and ceased entirely during the last twenty-four hours of life. Lémière, of Belgium,²²⁰ _{Sept. 23} cites a case of intercurrent pneumonia, complicated by an intra-muscular abscess in the abdominal wall, and extending into the crura of the diaphragm. The pus present, when treated by the method of Ribbert and Thost, was found to contain the diplococcus pneumoniacæ. An examination of the wall of the abscess showed a deeply-stained zone of limitation, containing diplococci grouped between the infiltrating cells and included—to the number of five or six in some instances—within the cells. It is believed that the suppuration resulted from the invasion of the diplococcus pneumoniacæ, but was limited by the intense process of phagocytosis.

Lache,³ _{July 13} alludes to the absence of observations upon the appearance of thrombosis complicating influenza. He has noted the appearance of this condition in pneumonia, articular rheumatism, and chlorosis, as well as a sequel of enteric fever and of the puerperal state. He has observed a tendency in influenza for thrombosis to occur more frequently in females than in males, in the ratio of 4 to 1.

Fiessinger⁵⁵ _{Sept. 24} calls attention to the occurrence of parotiditis coincidently with influenza. The inflammation appears to be due to a secondary infection, and is not allied to mumps. It was observed, however, that cases of mumps appeared in the same patient some weeks after the earlier attack, and that individuals that came in contact with influenza patients suffering from parotiditis as a complication were also affected with a similar enlargement of the parotid gland, but unassociated with any other symptoms of influenza. The inflammation has appeared at the outset of the attack,

more rarely in the course of the malady, and has ordinarily disappeared by resolution.

Boudet, of Lyons, ⁹⁹⁶ _{June 10, 1918}, reports a case of symmetrical gangrene of the lower extremities occurring in a tuberculous patient suffering from influenza. A pathologic examination established the absence of embolus or arterial disease, and the occurrence of gangrene is attributed to a thrombus of infective origin consecutive to influenza, while the symmetry of the lesion is ascribed to arterial spasm of central origin analogous to that occurring in Raynaud's disease.

Labadie-Lagrange ³¹ disputes the theory that abortion and premature labor in influenza depend upon mechanical irritation from coughing and hyperæmia, with local congestion. Many patients abort before the cough develops, and many others resist the tendency to miscarriage, notwithstanding an unusual rise in temperature, although in influenza most authorities admit the fact of a general tendency to local congestion, and especially to metrorrhagia. It is believed that the cause of the abortion in such cases is infection from the uterine mucosa. In proof of this two cases are cited. The first was that of a girl of 19 years, of tuberculous diathesis, who was admitted to hospital suffering from broncho-pneumonia. On the eleventh day she aborted. Three days after confinement phlegmasia alba dolens developed, followed on the fifteenth day by pyæmic abscesses in the sternal region.

Sequelæ.—Mills, of Philadelphia, ⁵³ _{Jan. 20}, classifies the organic nervous lesions occurring in the wake of influenza in the following order: neuritis, meningitis, myelitis, and cerebritis. He considers no single affection so common as neuritis, occurring in every form as to location and diffusion. He has observed the combination of multiple neuritis with poliomyelitis. Isolated neuritis of almost every cranial nerve has been recorded, with such resulting conditions as optic atrophy, loss of smell and of taste, ophthalmoplegias (both internal and external), oculo-motor, facial, and bulbar or pseudobulbar palsies of various types, including true pneumo-gastric paralysis. Several cases of specially-located affections of the sympathetic ganglia or nerves have been recorded. Of the forms of local neuritis most common may be mentioned the supra-orbital, intercostal, sciatic, and plantar. Althaus, of Lon-

don, ²² includes the psychoses following influenza among the other well-known post-febrile psychoses; he believes that they are more common after influenza than after other fevers. The only acute disease that could at all compare with influenza in this respect is enteric fever. Predisposition is found to be present in 72 per cent. of the cases; but attention is called to the circumstance that this influence is often exaggerated. Alcoholism was present in 11 per cent. The duration of post-influenzal psychoses was as follows: 12 per cent. recovered in a week, 32 per cent. within a month, and 56 per cent. lasted beyond a month. The termination was as follows: 7.6 per cent. died, 56.6 per cent. recovered, 35.8 per cent. remained uncured. Corner ² _{Aug. 20} states that in forty cases of post-influenzal insanity that he had observed, about half were melancholic and half maniacal. There was a distinct class, in which confusion was the chief mental symptom. Neurotic inheritance was very common. He found that almost any nervous symptom might follow influenza; for example, cephalalgia, trigeminal neuralgia, insomnia, loss of memory; tremors of face, tongue, and limbs; tremulous and hesitating speech, epileptiform seizures, syncopal attacks. Symptoms of peripheral neuritis were also said to occur; for example, paraesthesia, neuralgic pains, and changes in the reflexes; inequality of the pupils was also noted in one case of post-influenzal insanity. All of these symptoms might occur in general paralysis of the insane, and might also complicate simple influenzal psychoses. The difficulty in diagnostinating cases of ordinary insanity following influenza, when complicated by other nervous symptoms, and general paralysis of the insane, is great. Richards ² _{Aug. 20} states that, in his study of 1141 cases of influenza among insane patients, in no single instance did he find that the type of the mental disease had changed. In the cases of recurrent mania, in which the patient was fairly quiescent, an attack of acute insanity did not supervene. He is of opinion that influenza as a cause of mental disease has been much exaggerated.

Longuet, ³ _{July}, in discussing the pathology of nona, refers to the views of Tranjen, who believes that he has, in the three cases studied by him, found an infectious cerebro-spinal meningitis, the result of influenza, and dependent upon the same cause (the pneumonia coccus). He also alludes to acute haemorrhagic poliomyelitis as the pathologic basis of the affection.

McCarthy, of London, ⁶ reports a case of chorea following influenza. Three weeks after the subsidence of the attack of influenza the patient developed choreic movements, beginning in the fingers of the right hand. In a short time the muscles of the arm became affected, and, finally, the muscles of the face. The movements of the arm were so violent that it became necessary to control them by force. The movements ceased on the twelfth day, and the patient succumbed to exhaustion on the seventeenth day.

Oddo, ⁴⁶, in a study of post-influenzal spasmodic cough, observed that this symptom is more frequent in women than in men, and that it is more often found in children than in older persons. He argues from this that a cough of this origin arises in those whose nervous system is most susceptible; in other words, an antecedent neuropathy is the condition most favorable to the establishment of the affection, the nervous susceptibility being exalted by the effects of the influenza. In the treatment of the cough he advocates the employment of the nervines, especially antipyrin.

Treatment.—Ayer, of Boston, ⁹⁹, advises inhalations of oxygen in the acute pulmonary affections of asthmatic type occurring in influenza.

Mueller, of Yackandandah, Victoria, ²⁷, recommends mercuric chloride, in doses of from $\frac{1}{20}$ to $\frac{1}{16}$ grain (0.0032 to 0.004 gramme) every two hours. He has never produced salivation by this treatment. He discontinues the mercury upon the appearance of intestinal irritation. Hare, of Philadelphia, ⁸⁰, advocates, in the early stage of the disease, when the fever is marked, a fever mixture containing tincture of aconite, spirit of nitrous ether, and a solution of potassium citrate. Watson and Curtin, of Philadelphia, ⁵, recommend salicin, on account of its tonic properties, the large doses in which it can be given with safety, and the almost immediate results, in most cases, in reduction of temperature. According to these observers, it also appears that the early use of salicin is followed by fewer relapses than occur after the use of other remedies. They assert, however, that it is by no means a specific in the sense in which quinine is a specific in malaria. Iselin ³⁷⁶, recommends creasote in large doses. He administers it in pill form, each pill containing 0.05 gramme ($\frac{1}{4}$ grain), and the dose ranging from 20 to 25 pills daily. He advises inhalations of

creasote in the rhinitis and laryngitis that are likely to occur in the course of the disease. Hodgdon, ¹⁰⁴ who attaches great importance to frontal headache as a symptom, prescribes the following as a remedy for this:—

R Phenacetini,
 Salolis, 88 gr. xxx (2.00 grammes).
 Ergotini, gr. xij (0.78 gramme).
 M. et div. in capsulas no. xij.
 Sig. : One capsule every three hours.

Hutchinson ⁴⁵¹ attaches great importance to the administration of phenacetin to prevent severe neurotic symptoms, especially insomnia. He considers the tendency of the drug to produce extreme diaphoresis a disadvantage, and for this reason usually combines it with quinine. He has also obtained good results from a combination of hyoscine and camphor. Cooper, ²⁰⁷ of Atlanta, Ga., recommends the following pill as a sedative:—

R Phenacetini, gr. v (0.324 gramme).
 Pulv. opii, gr. ss (0.032 gramme).
 Camphoræ, gr. $\frac{1}{8}$ (0.0023 gramme).
 Pulv. ipecac., gr. $\frac{1}{10}$ (0.0018 gramme).

Sachs, of New York, ⁴⁵⁰ advocates, for the delirium of inanition and allied states, subcutaneous injections of morphine and atropine. The insomnia can be combated by prolonged warm baths, or, if necessary, by sulphur and paraldehyde. Cutter, of New York, ⁷⁰⁰, recommends sulphur by inhalation, and menthol, either in solution or by inhalation, for the bronchial catarrh of influenza.

INFLUENZA.

(From the ANNUAL for 1894.)

Although neither so intense in virulence nor so wide-spread in distribution as in the preceding three years, influenza recurred in epidemic form in 1892-93 and maintained the reputation as a serious disease that it had already established for itself. The investigations into the etiology of the affection have been pursued with assiduity and have resulted in the isolation from the sputum and the blood of a small, delicate bacillus that is believed to be the exciting factor. This organism appears to require for its development the presence of haemoglobin, and it is perhaps from a lack of knowledge of this fact that the bacillus was not demonstrated in the first epidemic. Monkeys and apes proved susceptible to inoculation with cultures.

It is not known what part, if any, the bacillus plays in the development of the complications of the disease. Some of these are, without doubt, due to secondary infection; others, such as the changes in the blood and in the blood-vessels, with the attendant occlusion and extravasation, are probably directly attributable to the activity of the influenza bacillus.

Bacteriology.—Pfeiffer, of Berlin,⁵⁸ points out that the sputum of influenza patients presents certain macroscopic peculiarities, being greenish yellow, tough and viscid, usually copious, and appearing in nummular masses. On bacterioscopical examination organisms were found that had rounded extremities, were not quite as thick as the bacilli of the septicæmia of mice, and were ordinarily two or three times as long as wide. A capsule could not be demonstrated; neither did the organisms appear to possess motility. Cultures were obtained upon agar by direct inoculation with the sputum, but the colonies could not be further transmitted. Investigation showed that their growth depended upon the presence of blood, and of the haemoglobin in particular; so that cultivations could be continued indefinitely upon agar to which either blood or haemoglobin had been added. The colonies formed are small, and do not cause liquefaction. They are characterized by a peculiar vitreous transparency. The organisms are rigidly aërobic. They grow at temperatures between 26° and 27° C. (78.8° and 80.6° F.), though best at 37° C. (98.6° F.). They do not live long in sterilized water, and are

extremely susceptible to drying, though it is probable that in moist sputum they retain their infectiousness for at least two weeks. The existence of spores could not be demonstrated, and there is considerable additional evidence to warrant a belief in their non-existence. It is thought that the contagion is usually transmitted by the moist secretions from the nasal and bronchial mucous membrane. The observations made were confined to cases of the catarrhal type of influenza. While the nasal secretion in these cases contained the characteristic bacilli in large numbers, that of cases of ordinary coryza contained remarkably few bacilli of any kind, and none at all of those believed to be peculiar to influenza. Early in the attack the organisms were found free in large numbers, but later on they were found in progressively increasing number within pus-cells. It was not possible to find the organisms in the blood. In fatal cases a peculiar form of pneumonia was found after death, somewhat lobular in distribution, and with an entire absence of fibrin from the extravasation, the centre of each consolidated lobule presenting a small, grayish-yellow nodule. The organisms were found in progressively increasing number in passing from the superficial to the deeper structures of the lung. The most favorable result of the pulmonary process that can occur is resolution, the purulent masses in the lung being expectorated. On the other hand, abscess-formation may take place, or the infiltrated tissue may at once become transformed into fibrous tissue, induration or carnification resulting. Finally, the case may terminate in pulmonary gangrene; and it is believed possible for caseation to take place. In examinations in a large number of cases of bronchitis and broncho-pneumonia, at a time when influenza was not prevalent, an organism was found that so closely resembled the bacillus of influenza in form, in reaction to stains, and in culture, that the name of pseudo-influenza bacillus has been given it. The pseudo-influenza bacillus is, however, larger in all dimensions than the organism of influenza proper, and forms in long chains. It is believed that some relation may exist between the two organisms, and that they may be members of one group.

The annexed colored plate will serve to further illustrate the results attained. Fig. 1 represents sputum from a case of influenza during the febrile stage, with the bacilli free; Fig. 2, the sputum from a case of influenza during the period of defervescence,

with the bacilli inclosed in pus-corpuscles; Fig. 3, the sputum from a case of influenza during convalescence, the bacilli showing degenerative changes; Fig. 4, the influenza bacilli in pure culture; Fig. 5, the bacillus of pseudo-influenza; Fig. 6, portions of the same bronchi, more highly magnified; Figs. 7 and 8, transverse sections of bronchi at various stages of influenzal catarrh, under a low power; Fig. 9, a section through infiltrated pulmonary tissue in the centre of a typical influenzal process.

In a post-mortem examination of five cases of influenza, clinically characterized by symptoms simulating those of cerebro-spinal meningitis, Pfuhl, of Berlin, ^{Sept. 28, 1918}⁴, found congestion of brain, cord, and membranes, meningeal exudation, flattening of the convolutions, œdema, distension of the ventricles, dilatation of the capillaries, with haemorrhagic extravasations, and in one of the cases a collection of pus in the cerebellum. In all of the cases bacteriological examination disclosed, in the blood-vessels and lymphatics, the presence of the bacilli described by Pfeiffer as characteristic of influenza. In some situations the bacilli had formed thrombi; they were also found in the liver, spleen, and kidneys. They were commonly associated with the bacilli of decomposition and two different forms of diplococci.

Markl ⁷⁵⁸_{Nov. 19, 1918} ⁸⁴⁴_{Jan. 1} details the result of a careful study of 11 cases of typical, uncomplicated influenza. On examination of the blood, obtained with the most rigid precautions, he found a small number of ovoid bacilli, from 0.8 to 1.5 millimetres long, and from 0.3 to 0.6 millimetre thick, rounded at one extremity and pointed at the other. The organisms did not take stains well, the poles being usually stained, while the middle did not stain. They developed upon agar and upon gelatin. The injection of cultures into the veins of rabbits was followed by fever and death. In the blood of these animals the same ovoid bacilli were to be found. Other rabbits inoculated with the blood from the first series of rabbits failed to present symptoms of influenza. Similar bacilli were found in the sputum of cases of influenza. Rabbits inoculated with this sputum presented symptoms of influenza, and finally died. Rabbits inoculated with the blood from these animals likewise presented symptoms of influenza, and also died. Lemière, of Lille, ²²⁰_{Sept. 10, 1918} found that in the majority of cases, if not in all, in which suppuration occurred, in the course or



Influenza (Pfeiffer)

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sequence of influenza, the pus at some time contained pneumonia cocci. The microbe of influenza, described by Pfeiffer, is not always found in the pus that forms in the course of the disease.

From a survey of the literature of the influenza epidemic of 1889-90, Seitz, of Zurich, ²¹⁴ _{Jan.} arrives at the conclusion that the disease is of bacillary origin, and transmissible by human intercourse, particularly through influenza patients. One attack confers relative immunity to subsequent infection; so that of two successive epidemics the second is likely to spread the less rapidly and to be the less extensive. From the nature of the causative factors, new outbreaks are likely to take place after an epidemic has once occurred. The epidemic progress of the disease is not influenced by season, except in so far as this may affect human intercourse.

Symptomatology.—Delezenne, of Lille, ⁹² _{Oct. 10, '92} describes as a distinct clinical variety a group of cases of influenza to which he applies the qualification "typhoid." The onset of the attack is usually abrupt. Prodromes are obscure or wanting. Among the earliest symptoms are repeated and irregular chilliness, malaise, depression, muscular pains in the muscles of the extremities and of the lumbar region, and frontal and supra-orbital headache. These symptoms appear almost simultaneously, and reach their maximum intensity in the course of a few hours. They are frequently accompanied or followed by epistaxis, vertigo, tinnitus aurium, nausea, and vomiting. The appetite is lost; thirst is increased; a bitter taste is complained of; the tongue is red at the edges and tip, but generally moist and covered in its middle with a heavy, grayish-yellow coat. At first there are no abdominal symptoms; constipation is the rule. Sore throat, coryza, or laryngitis may be present. At the end of several days the depression becomes extreme and the facies expressive of stupor and hebetude. Insomnia, delirium, and deafness now appear, with other symptoms characteristic of the typhoid state. In grave cases the lips become dry, sordes collect upon the teeth, the tongue is tremulous, and speech is embarrassed and drawling. Sometimes there develops a sort of semi-coma, with hallucinations, carphology, and subsultus tendinum. This period ordinarily lasts about a week. Meanwhile the constipation may persist, or be replaced on the second or third day by diarrhoea; though this may be entirely

wanting, or appear only at the end of the acute stage, or even during convalescence. The stools are numerous, and almost colorless and odorless. The abdomen is often distended and painful to pressure. The muscles are tender and the skin hyperæsthetic. Gurgling is ordinarily present, but, like the pain, it may be diffused over the entire abdomen, though most marked in the right iliac fossa. Rose-spots and sudamina may also be present. The spleen is usually enlarged and sensitive to pressure; the liver may be transiently enlarged; the urine is almost always albuminous. Most of the symptoms of the first stage persist during that just described. The headache may preserve its previous intensity; the muscular pains may extend to the extremities, the loins, the nape of the neck, the abdominal muscles, the thorax, and elsewhere. The anorexia, the nausea, and the coated tongue ordinarily do not disappear until convalescence has set in. The manifestations detailed are often accompanied by broncho-pulmonary symptoms. Often there is cough, with copious expectoration and dyspnoea. On auscultation sonorous and sibilant râles are to be heard throughout both lungs, with subcrepitant râles at the bases. Sometimes a notable diminution of the vesicular murmur is apparent. The pulse is ordinarily small, rapid, soft, and compressible. The thermometric curve presents no peculiarity beyond that which belongs to influenza in general. The duration of the individual attack may be from one week to three weeks, the symptoms subsiding gradually. Convalescence is always protracted, being characterized by the persistence of the muscular pains, by lassitude, and depression. Cough, anorexia, and diarrhoea may also persist. This form of influenza must be differentiated from enteric fever. The prodromal period of enteric fever is the longer,—the malaise, the anorexia, the pains in the back ordinarily lasting for a week. In influenza prodromes may be entirely wanting, while epistaxis is insignificant or absent. On the other hand, the repeated chills, the coryza, and the laryngitis are absent in enteric fever. The headache of influenza is sharp and lancinating, and often frontal or temporal. In enteric fever it is rarely as intense, the pain being referred rather to the nape of the neck. The muscular pains are likewise the more marked in influenza, and also the more persistent. The hyperæsthesia of influenza is not encountered in enteric fever. In influenza the tongue is not dry, fissured, and

blackish as it is in enteric fever, but remains moist and covered with a membrane-like coating. The delirium, the hallucinations, the subsultus, the carphology, and the coma are usually less pronounced in influenza than in enteric fever. Gurgling is the more generalized and constipation the more common in influenza; the stools are less ochre-colored and less fetid. The spleen is rarely enlarged to the same degree in influenza as in enteric fever, and the pulse is rarely dicrotic; the cough is ordinarily more intense, the expectoration more abundant, and the dyspnoea more pronounced; the physical signs are more marked. Enfeeblement of the respiratory murmur, so commonly observed in influenza, is rarely encountered in enteric fever; the temperature at the outset in the latter rises gradually and progressively, while in influenza it does so suddenly, on the first or second day, or, if gradual, without the regularity observed in enteric fever. At the height of the attack of influenza the thermometric oscillations are greater and less regular than in enteric fever; the temperature rises after it has fallen, which it does not do in enteric fever.

At a meeting of the Société médicale des Hôpitaux, Faisans¹⁴ called attention to a peculiarity of the tongue that he had observed in cases of influenza, and which he believed to be characteristic. It consisted in an appearance of porcelain-like whiteness, associated with humidity. The coloration was sometimes uniform, sometimes mottled. It made its appearance within the first two or three days of the attack, and sometimes persisted until the patient believed himself well. Shelly² has observed, in a considerable number of cases of influenza, a peculiar vesicular eruption on the soft palate, which he considers characteristic. The eruption consists of little vesicles resembling sago-grains, of from 0.5 to 1.0 millimetre in diameter. These were situated chiefly upon the soft palate, though they sometimes appeared upon other parts of the pharyngo-buccal cavity. The condition was more marked in the respiratory forms of influenza and somewhat antedated the onset of other symptoms, and remained after these had subsided. Jones² reports a local epidemic of influenza, attended with high mortality from hyperpyrexia, in a remote, comparatively inaccessible, sparsely populated, mountainous country district, of an area of about three or four miles, and not traversed by any highway of communication between large centres of population. The com-

munity was largely engaged in agricultural pursuits. The patients ranged in age from 8 to 53 years. There were twelve fatal cases, all in males. Symptoms of a catarrhal condition of the respiratory tract were practically absent. Treatment was of no avail.

Complications and Sequelæ.—Putnam, of Boston, ⁹⁹ reviews the neural complications of influenza and reports three cases. One of these was in a single woman of 72, who, previously in good health and without indications of renal or cardiac disease, was, several weeks after convalescence from an attack of influenza, suddenly seized with loss of consciousness, lasting for fifteen minutes. Several days later there was twitching of the left side of the face and of the left arm, without derangement of consciousness. Finally left hemiplegia developed and consciousness was lost, to be regained partially a little time before death. At the post-mortem examination, in addition to some atheroma of the basal vessels, the cerebral perivascular lymph-spaces were found to be dilated, with areas of staining and slight softening in the right basal ganglia and internal capsule. On microscopic examination of the softened tissue there were found haemorrhages from capillaries and small arteries, with fullness of all of the vessels; a considerable number of colorless blood-cells in the vascular sheaths, and often in the surrounding tissues; a modification of the normal structure of the tissues in the areas occupied by the haemorrhages; and hyaline bodies suggestive of corpora amylacea. The second case was in a man 38 years old, who, eight weeks after an attack of influenza, attended with intense headache, while sneezing violently, found that he could not see or hear. Two weeks later an attack of left hemiplegia occurred, and speech became slightly impaired. The symptoms gradually subsided, but after the lapse of more than a month ophthalmoscopic examination disclosed the existence of well-marked bilateral optic neuritis, with moderate swelling and slight haemorrhages. In the third case, a man 55 years old was thought to have influenza. The left arm and leg became paretic, and left-sided convulsions occurred repeatedly, with loss of consciousness. The urine contained no albumen; the temperature was but slightly elevated. The hemiplegia upon the left side became complete. In view of the possibility of the occurrence of meningeal haemorrhage, or of the existence of an abscess, the skull was trephined. When the dura was opened the

brain did not pulsate. The cortex was dark in color and a thick layer of pus followed the course of the large vessels visible in the opening. The patient became conscious after the operation, but later the convulsions returned and led rapidly to death. It is thought that a purulent meningitis existed. Putnam ⁹⁹ _{Oct. 27, '92} also reports the case of a man in middle life and previously in good health, who, following an attack of severe and typical influenza, presented inco-ordination of all four extremities, with impairment of sensibility and other symptoms pointing to chronic neuritis, probably associated also with myelitis. After the subsidence of the early symptoms of the illness, severe epigastric pain, of the nature of the "girdle sensation," set in and persisted for a year. The weakness that developed in the legs became transformed into inco-ordination, and this became so pronounced as to prevent walking alone. There was little paræsthesia, but a high degree of impairment of sensibility in the feet and legs, gradually diminishing toward the upper part of the thighs. The knee-jerk was absent. The hands were also ataxic, and there was slight lack of control over the bladder. Other symptoms of posterior spinal sclerosis were not present. Leyden, of Berlin, ⁴¹ _{June 1} has reported a case of multiple neuritis and one presenting the clinical features of acute ascending paralysis of the type described by Landry in the sequence of influenza. Paret, of Lyons, ²¹¹ _{Oct. '92} has reported the case of a woman 20 years old, without hereditary predisposition, in which an attack of influenza was followed by suppression of menstruation, previously regular. At the same time the woman became morose and taciturn, eating irregularly, and sometimes going for weeks without food. The clinical picture was that of melancholia with stupor. There was marked emaciation, but no evidence of visceral disease. The pulse was ordinarily above 100; often it was 160 per minute. The temperature was almost always subnormal. There was no disturbance of sensibility. The muscles displayed a tendency to stiffness, which in the course of time progressed to actual contraction. The condition gradually grew worse until death ensued. At the post-mortem examination evidences of meningo-encephalitis of infectious origin were found.

Kapper ⁸⁴ _{Nov. '92} has reported the case of a man who complained of pain at the lower boundary of the chest, at the insertion of the diaphragm, as well as on both sides of the neck, radiating toward

the shoulders and the back. There was shortness of breath and painful, superficial, and moderate hiccup. The latter became aggravated and occasionally accompanied by yawning or vomiting. The temperature was elevated, but on the morning of the second day it had fallen. By the fifth day the spasm of the diaphragm had diminished both in frequency and in intensity, and in the course of two weeks all of the symptoms had disappeared. Examination of the sputum disclosed the presence of the bacillus described by Pfeiffer. Various therapeutic measures were employed, but the best results appeared to be obtained from faradization of the phrenic nerves, the diaphragm, and the epigastrium, after the administration of antipyrin.

Gowers, of London, ^{July 1}⁶, points out that, as in other acute specific diseases, there is no relation between the nervous sequelæ of influenza and the severity of the primary disease. He believes that one attack affords no protection against subsequent infection, and that many of the most serious sequelæ follow second or third attacks. No division of the nervous system escapes,—spinal or cerebral, motor or sensory. The sequelæ present themselves as organic affections, as well as in the garb of the various neuroses and psychoses. In the vast majority of cases the prognosis is good. Wilks, of London, ^{July 22}⁶, contends that what are commonly described as the nervous sequelæ of influenza constitute a very essential part of the complaint proper, and in many cases are the primary and only symptoms. Many of these are observed during the first few hours of the illness and continue until its termination. During the last epidemic a striking feature in the fatal cases complicated by pulmonary affections, bronchial, congestive, or pneumonic, was the remarkable depression, apparently due to a direct influence upon the heart. In some of the cases of this kind the failure of the heart's action was so abrupt as to distinguish them from cases of ordinary pneumonia or bronchitis. Pope ^{July 26}²⁶, reports cases of the following forms of nervous disease that he has observed in the sequence of influenza: acute cerebritis, peripheral neuritis, chorea, urticaria, anosmia, optic neuritis, irregularity and irritability of heart, angina pectoris with albuminuria, sciatica, and lumbago.

Hetherington and Brown, of Ipswich, ^{Jan. 21}⁶, have reported the case of a boy of 15, in whom, during an attack of influenza, there appeared increased thirst, increased frequency of micturition in-

creased amounts, and loss of flesh and strength. The urine had a specific gravity of 1040, and contained a large proportion of sugar. Under a strictly regulated diet, in conjunction with the administration of codeine, $\frac{1}{2}$ grain (0.03 grammes) three times daily, there was speedy improvement, progressing to complete recovery, so that at the end of a month the codeine was withdrawn and ordinary diet resumed. Fenwick, of London,² has observed that influenza may evoke urinary lesions, such as acute inflammation of the kidney, bladder, and prostate. The majority of the cases presented inflammation of the neck of the bladder and of the adjoining surface of the prostate gland. In some cases there was sharp haematuria, which the electro-cystoscope, in a number of instances, demonstrated to proceed from submucous haemorrhages of the bladder, and in two instances from villous growths that had been called into activity by the acute illness. A certain number of cases presented atony of the bladder, in consequence of overdistension, which had passed unnoticed while the patient was delirious. It was observed that influenza also increased the severity of any pre-existing urinary disease, though usually the exacerbation was but transitory. An attack often proved a touch-stone of real value in detecting any weak point or predisposition to disease in the urinary tract. As a rule, as soon as the influenza subsided, the urinary disease also abated; but in some rare cases obstinate genital neuralgia remained, indistinguishable in its clinical features from that induced by onanism, tabes, or by severe malarial or septic intoxication.

Poore, of London,¹⁰⁷⁷ makes reference to three cases of influenza in which haematuria occurred. In all, it is believed, there existed some vulnerability of the kidneys acting as a predisposition to the occurrence of haemorrhage.

Chambrelet, of Bordeaux,¹⁸⁸ has reported the case of a woman, eight months pregnant, who was seized with an attack of influenza of the gastro-intestinal type, attended with diarrhoea, but without hyperpyrexia. The heart-sounds could be heard, though they were feeble. After the lapse of a week premature labor set in and a macerated foetus was born, presenting an appearance as if it had been dead for about the period that had elapsed from the attack of influenza.

Mangelot^{2016; 243} divides the pleural complications of influenza into six varieties: (1) dry pleurisy; (2) subpleural oedema; (3)

serous pleurisy; (4) hæmorrhagic pleurisy; (5) protopathic purulent pleurisy; (6) suppurative pleuro-pneumonia. The dry and the sero-fibrinous pleurisies are characterized by their development in the period of deservescence, and by the variability of the stethoscopic phenomena. Hæmorrhagic pleurisy and protopathic purulent pleurisy are comparatively uncommon, while suppurative pleuro-pneumonia is comparatively common. Rendu, of Paris,¹⁴ has reported two cases of influenza complicated by broncho-pneumonia, in which sudden death took place without appreciable cause. The one occurred in a woman, 50 years old, who had previously been robust and in good health. On the fourth day of an attack of influenza of pulmonary type, as convalescence appeared about to set in, the heart was discovered to be irregular. In a short while cyanosis abruptly developed, the heart failed, and death took place. The second case occurred in a woman, 42 years old, who, on the eighth day of an attack of influenza, complicated by broncho-pneumonia at the base of the right lung, was suddenly seized with syncope. In the absence of adequate cause, and from a knowledge of the effects of the influenzal poison upon the nervous system, the conclusion is arrived at that the heart-failure resulted from paralysis of the vagus, and that the asphyxia was of bulbar origin.

Hull, of Lakewood, N. J.,¹⁵ has reported a case of influenza, complicated by pneumonia, in a woman 25 years old, in which the pulse during a period of eleven days, alternately, rose and fell irregularly between the limits of 40 and 110, pulse-beat and heart-beat being synchronous. Recovery ultimately ensued.

Orlandos, of Athens,¹⁶ has reported the case of a man of 37, in whom, shortly after an attack of influenza, pneumonia developed and ran its course in eleven days. As convalescence was about to set in, the man was seized with intense pain in the right lower extremity, which, upon examination, was found to be livid and covered with petechiæ. In a short time the part became greatly swollen and exquisitely tender, particularly in the course of the saphenous and femoral veins; and large bullæ formed. The œdema extended upward to the margin of the ribs. The function of the bladder was in abeyance for three months. Absolute rest was enjoined and inunctions of mercurial and belladonna ointment were practiced. Under this treatment some progress was being

made, when suddenly the patient was awakened from sleep by intense dyspnoea, accompanied by a sense of great anxiety, profuse sweats, chills, small pulse, and pallor. The condition yielded to stimulation, but for several days there was annoying cough with fibrinous expectoration. Shortly after this left-sided pleurisy developed. As final complications there occurred, successively, thrombosis of the left femoral vein and inflammation of the right basilic and pulmonary embolism. Notwithstanding these, the patient, after an illness of four months, entered upon convalescence and recovery followed.

Of 2000 cases of aural disease observed by Kosegarten, of Kiel, ⁸⁴⁴ _{Dec., '92; Apr.} ¹¹ of the patients attributed the condition to influenza. In only 3 were the symptoms very severe. In none was haemorrhage into the membrana tympani observed. The attic was exclusively or chiefly affected in a remarkably large number. In cases in which the inflammation was confined to the attic, Shrapnell's membrane was intensely congested and swollen, sometimes bulging in a saccular form. The congestion extended to the adjacent part of the upper wall of the meatus. The vessels of the malleus were moderately injected, but the rest of the membrane was normal, with the exception of a slight loss of lustre. Puncture of the membrane of Shrapnell gave exit to a quantity of viscid and usually sanguineous fluid.

Schell, of Terre Haute, ⁵⁶ _{Feb.} has reported the case of a man, 61 years old, in whom, two or three weeks after recovery from an attack of influenza, the glands of the neck were observed to enlarge, and soon afterward other glands in various parts of the body became similarly involved. On examination of the blood, it was found that there were 3,500,000 red corpuscles to the cubic millimetre and about 1 colorless cell to 80 red. There was palpitation of the heart, and hæmic murmurs could be heard on auscultation. The pulse and respiration were accelerated. Headache was frequent, and there was occasional vertigo. The area of splenic percussion dullness was augmented. Eye-ground and urine presented no abnormality. Death occurred in a short time as a result of pneumonia. No post-mortem examination was made.

Lemière and Didier, of Lille, ²²⁰ _{Nov. 11, '92} report a fatal case of influenza in which, several days before death, a generalized polymorphous erythema developed. In sections of the affected tissue they were

able, post-mortem, to demonstrate the presence of micro-organisms that they believed to be pneumonia coccii.

Curtin and Watson, of Philadelphia,⁴⁵¹ consider the action of influenza upon the heart, and report the results of a study of the angina pectoris of influenza. In the old they particularly observed intermittence with irregularity, while in the young a condition of simple heart-weakness seemed to predominate. Blueness of the lips was a common symptom. The majority of cases were characterized by diminished frequency of the action of the heart; rapidity of action was observed in but a small number. Many cases presented syncope. In old persons with angina pectoris sudden death was quite common; cases in gouty individuals were particularly prone to terminate in this way. In the young and vigorous, anginal symptoms were common, but death was seldom a result.

Roland¹⁴ has reported the case of a smith, 31 years old, of robust constitution and without hereditary predisposition, who, on resuming work after an attack of influenza, was seized with pain in the right upper extremity. The hand soon became pale, then livid, and pulsation could not be perceived in the radial and also in the brachial artery. Finally, the fingers and the distal half of the hand presented the characteristic black of gangrene of arterial origin. A line of demarkation formed, and it was thought that the patient would recover; but the right foot became involved, and death supervened. Morlat and Rogier¹⁴ report the case of a chlorotic girl, 18 years old, who, during convalescence from an attack of influenza of moderate intensity, was suddenly seized with sharp pain in the calf of the right leg, and eight days after with similar pain in the calf of the left leg. Both extremities became pale and oedematous, and otherwise presented evidences of phlebitis. In a short time moist gangrene set in upon the left side and led to a fatal termination a month afterward.

Leyden, of Berlin,⁶⁹ has reported the case of a girl, 20 years old, who, four weeks after an attack of influenza, presented a suppurating angina. A week later, in the morning, on rising, she felt a sharp pain in the left hand, which, toward evening, was observed to be pale. In the course of a few days the pallor gave way to cyanosis, with which was associated a sense of coldness and weakness. The discoloration extended to the forearm and to the lower third of the arm, and swelling became superadded. There

was some pain and retardation and enfeeblement of movement. There appeared to be slight hyperesthesia. It was found that the left radial pulse was absent at the wrist; neither could pulsation be felt below the middle third of the arm; while below, a cord-like mass could be made out. On physical examination no lesion of any organ could be detected. The urine contained neither albumen nor sugar. There was an absence of febrile symptoms. The family history and the personal history were good. In the absence of a cardiac lesion or other disease, the conclusion was arrived at that the condition must be dependent upon the spontaneous formation of an arterial thrombus, as a sequel of influenza, from the breaking down of the colorless corpuscles of the blood. For several days the thrombosis extended and the symptoms became more pronounced, but subsequently the conditions moderated, until perfect recovery finally ensued; the occlusion of the brachial artery, however, persisting, and a collateral circulation being established. A second case is reported as having occurred in a medical man 50 years old. Shortly after an attack of influenza, symptoms of occlusion of the popliteal artery appeared, for the relief of which amputation became necessary. After a protracted convalescence, retarded by numerous complications, the patient ultimately recovered. In this case, also, there was no cardiac lesion, and the family and personal history were good.

Immunity.—As the result of an investigation carried on in the laboratory of Tizzoni, at Bologna, Alessandro ⁶⁹_{No. 22; Sept. 19} ⁵⁷ has found that rabbits can, by inoculation, be rendered immune to cultures of the bacillus of influenza. The highest degree of immunity is conferred through blood-cultures carefully filtered. The serum of such protected animals is antitoxic rather than bactericidal. The serum of vaccinated animals possesses the property of conferring immunity to influenza upon other animals in the proportion of $\frac{1}{2000}$ or less for every gramme (15 grains) of body-weight. The serum of immune animals also possesses curative properties.

Treatment.—Upon the basis of the infectiousness of influenza, and the disinfectant properties of the chlorides, Elwert, of Reutlingen,¹³³ has adopted the following line of treatment: For adults he prescribes hydrargyri chloridi corrosivi, 0.02 to 0.03 gramme ($\frac{1}{2}$ to $\frac{1}{4}$ grain); sodii chloridi, 0.10 gramme (1 $\frac{1}{4}$ grains); morphinæ

sulphatis, 0.02 to 0.03 grammme ($\frac{1}{2}$ to $\frac{1}{4}$ grain); aquæ destillatæ, 150.0 grammes (4 $\frac{1}{2}$ ounces); syrapi aurantii corticis, mucilaginis gummi arabici, $\text{a}\bar{a}$ 20.0 to 25.0 grammes (5 to 6 $\frac{1}{2}$ drachms). M. Sig.: Take a tablespoonful every four or five hours. If diarrhœa exist, 15 drops of tincture of opium may be added to each dose. For children the following combination is prescribed: hydrargyri chloridi corrosivi, 0.005 grammme ($\frac{1}{2}$ grain); sodii chloridi, 0.05 grammec ($\frac{1}{2}$ grain); aquæ menthæ piperitæ, 70 to 80 grammes (2 $\frac{1}{2}$ to 2 $\frac{1}{2}$ ounces); syrapi simplicis, mucilaginis gummi arabici, $\text{a}\bar{a}$ 25 grammes (6 $\frac{1}{2}$ drachms). M. Sig.: Take a teaspoonful every one or two hours. In case of sleeplessness, pain, or diarrhœa, a small amount of tincture of opium may be added to each dose. Of the following solution a portion is used twice or thrice daily by atomization in the nares and as a gargle: Hydrargyri chloridi corrosivi, 0.03 grammme ($\frac{1}{2}$ grain); aquæ destillatæ, 50.0 grammes (1 $\frac{1}{2}$ ounces). M. Sig.: To a portion add an equal amount of warm water. This solution may also be employed prophylactically to advantage.

In the treatment of the cardiac complications of influenza Curtin and Watson, of Philadelphia,⁴⁵¹ found alcohol of the first importance in cases of simple heart-failure. Caffeine citrate and cactus grandiflora proved next in value. Digitalis and strophanthus were also of use; while atropine seemed to exercise a special influence for good. Nitro-glycerin appeared to act well in the aged and in gouty cases at any period of life. Strychnine was often of great service. In cases marked by anæmia, hypophosphites, iron, arsenic, quinine, and strychnine were employed. In chronic cases codliver-oil proved useful.

THE MALARIAL FEVERS.

(From the ANNUAL for 1888.)

Etiology.—Osler⁷ refers to the researches of Laveran in Algiers, who found in the blood of persons suffering with malaria: (1) crescentic pigmented bodies; (2) pigmented bodies in the interior of the red corpuscles which underwent changes in form described as amoeboid; (3) a pigmented flagellate organism. These forms he regarded as phases in the development of an infusorial organism which he considered to be the germ of the disease.

Osler describes in detail and at considerable length the various forms assumed by these bodies, as (1) Amœboid bodies in the red corpuscles. (2) Pigmented bodies in the red corpuscles. (3) Larger solid bodies in the interior of vacuoles. (4) Free pigmented crescents, which crescents may sometimes be seen to develop in the interior of the red corpuscles. (5) Rosette forms. (6) Scattered small bodies, the result of segmentation of the rosette forms,—also described with great fullness by Golgi. (7) Flagellate organisms, round or ovoid or pear-shaped, with finely granular protoplasm containing pigment with flagella variable in number, one, three, or four being observed at different times. (8) Small, round, pigmented bodies from one-fourth to one-half the size of the red corpuscles.

Both the amœboid and pigmented bodies were met with in both acute and chronic cases, appearing, however, to be more especially characteristic of the acute manifestations of the disease. The hyaline non-pigmented forms and vacuoles containing solid bodies were also more common in the acute cases. The crescents appear to be associated with the more chronic forms of malaria and acute cases which have been under treatment for some time. The rosette form, with its peculiar rosette segmentation, occurred in six cases, invariably in association with amoeboid intra-cellular bodies. The flagellate organisms were present in seven cases, six of which were chronic cases and one an acute case of three weeks' duration. The small, free, pigmented bodies were more abundant in the chronic form with cachexia. In regard to the relation of these forms to

the paroxysms, there were instances in which the amoeboid organisms were decidedly more numerous before and during the paroxysm than in the intervals. There were others in which the number during the chill and hot stage was so small that examples were very hard to find. In others again, slides taken before the attack and during each stage were negative, and yet in subsequent paroxysms the bodies were present in the blood. Osler holds the opinion, all things considered, that the pigmented bodies on the red corpuscles are more numerous before and during the attack, but the difference is by no means striking. The segmentation seems in some way associated with the paroxysm, but its relationship requires further investigation. As to the influence of medicines upon the organism, quinine invariably causes the pigmented bodies to disappear. In recent cases this remedy acts as a positive specific against these organisms just as it does against the malady itself. Arsenic does not seem to influence the pigmented intracellular bodies. Thallin and antifebrin had no effect.

Until the true affinities of the organisms are determined by an expert, its proper place seems to be the genus *haematomonas* of Mitrophanow, which conveniently includes all monads parasitic in the blood. Thus, genus, *haematomonas*; species, *haematomonas maliariae*; definition, body plastic, ovoid, globose, no differentiation of protoplasm, which contains pigment grains. Flagella variable from one to four, highly polymorphic, occurring in (1) amoeboid form; (2) crescentic encysted form; (3) sporocysts; (4) circular free pigmented bodies. The name designates the natural affinities of the parasite, its habitat and the conditions under which it grows; on which grounds it seems preferable to that of *plasmodium maliariae* suggested by Marchiasava and Celli.

Councilman⁷⁸ announced at a meeting of the Pathological Society of Philadelphia in October, that he had found in greater or less abundance the whole series of organisms described by various observers as existing in the blood of malarial patients. The segmental organism he found in a large number of cases just before and during the chill, and believes it to be characteristic of that stage. The crescentic organism he found solely in malarial cachexia, in which condition, when intense, it often exists in extraordinary abundance. Blood taken directly from the spleen was found to be especially the home of the various organisms, and it

was chiefly from it that the flagellate forms were obtained. He had carefully studied the effect of the administration of quinine upon these organisms, and found its influence, in large doses, upon the form which accompanies the acute intermittent paroxysm and which is characteristic of the chill period, most pronounced. The administration of fifteen grains of quinine upon three or four successive days is often followed by the almost complete disappearance of the organism, whilst the administration of forty-five grains daily for three days, always causes the organism to completely disappear. On the other hand, the crescentic organism of malarial cachexia does not appear to be particularly affected by quinine.

E. Maurel⁷⁹ announced to the French Association for the Advancement of Science that it is always easy to distinguish a healthy from a malarial soil. The water taken from malarious districts always contains numerous micro-organisms, some of which are possibly Laveran's corpuscles in an early stage of their development. In regard to the real value of Laveran's corpuscles in the production of malaria, he believes them to be indirectly concerned in the production of the affection, although their relation to it has not yet been absolutely demonstrated.

Symptomatology.—Page⁸⁰ found in more than two thousand cases of sick children observed among the poor of New York, about five per cent. to be suffering from malaria. The chief symptoms are anorexia, more or less frequently constipation, coated tongue, sweating and pyrexia. Anæmia of a high grade is common. Only four or five per cent. of the cases were jaundiced. Twenty per cent. of the cases had bronchitis. The treatment was commenced by the administration of small doses of calomel followed by a saline, and this followed by quinine during the continuance of the fever. Sometimes the quinine was administered in anticipation of the paroxysm. In the stage following the fever, Fowler's solution proved itself superior to quinine, and the subsequent anæmia was most efficaciously treated by the tincture of the chloride of iron. *Nux vomica* and bitter tinctures proved good after tonics. These cases yielded to treatment better than similar cases in adults.

Singer⁸¹ reported a case of acute polyneuritis following a grave attack of malaria which occurred in Singapore.

Treatment.—According to Rouquette,⁸² the malarial microbe

gives rise to symptomatic fever by reason of its activity in producing leucomaines. During the access of fever the microbe is eliminated by the natural emunctories. The liver is a great destroyer of leucomaines. If an inhabitant of Algiers who has never had an access of fever, develops ague on returning to France, it is for the reason that his liver has to some extent lost its power of elimination and that it does not sufficiently destroy leucomaines, it being, according to this author, due to the fact that the liver and spleen are organs of elimination that these organs undergo hypertrophy. According to Rouquette, the primary indication in malaria is to restore these organs to their normal volume. To accomplish this purpose, he injects directly into the tissue of the spleen a Pravaz syringeful of the following solution: aqueous extract of ergot [Bonjean], 2 grams; water, 10 grams; glycerine, 10 grams. This operation is repeated at intervals of some days, once or twice.

Alberto Solaro,⁸³ at the suggestion of Professor Fenoglio, treated five cases of malarial splenic tumor by the injection of Bonjean's ergotine diluted with water, in doses of from .05 to .35 grams. He summarizes his results as follow: (1) The injection of ergotine into the spleen is useful in bringing about resolution of malarial enlargement of that organ. (2) The general condition is improved. (3) The injection is followed by rise of temperature. Query: Is this rise caused by the malarial infecting principle previously latent in the spleen finding its way into the general circulation? (4) It is necessary to use quinine in connection with the injections of ergotine. (5) This treatment should not be employed in individuals extremely reduced.

Savitzka⁸⁴ found that a combination of ergotin with quinine acts very satisfactorily in intermittent fever, especially when accompanied by an enlarged and tender spleen, and that in this way a considerable quantity of quinine can be saved, as one-half the dose of quinine which would be required if given alone, will suffice if combined with ergotin. The preparation of ergotin used was Bonjean's, the dose in chronic cases being about one grain three times a day.

Soshinski has been in the habit of prescribing phosphorus in all of his cases of intermittent fever during the past five years and has had excellent results from its use. He administers five drops of the oil of phosphorus well diluted, three times a day.

H. M. Clark⁸⁵ treated no less than ten thousand cases of malarial disease with picrate of ammonium and kept a record of half of these cases. In nine cases only out of the five thousand did the remedy fail. The usual dose is from one-eighth to one and one-half grains, four or five times a day, in pill form. One-half a grain is the average dose. All forms of malarial disease yield promptly. Picrate of ammonium does not produce headache, deafness, tinnitus, etc., nor does it disorder digestion or cause nausea. His experience has led him to the conclusion that in all varieties of intermittent fever, and in malarial neuralgias, picrate of ammonium is a valuable antiperiodic, and it is an efficient and perfect substitute for quinia. It has the following advantages over quinine: (1) It is much less expensive. This is an important consideration where hundreds of cases of malarial diseases have to be treated annually. (2) The dose given is very much smaller. (3) It does not produce the unpleasant effects that quinine does,—headache, deafness, tinnitus, etc.; nor does it disorder the digestion or cause nausea, as quinine is apt to do, in the doses in which it has sometimes to be given.

Dr. Joseph Levi, Corresponding Editor of the ANNUAL in the Virgin Islands, has used the permanganate of potassium in the treatment of chronic malarial affections with very interesting and successful results. The usual dose is one-half to one grain in water three times a day. He likewise affirms that all chronic affections due to malarial toxæmia have been treated with great success by this drug. Putauski⁸⁷ recommends deep hypodermic injections of muriate of quinine in cases of intermittent fever that do not yield to the internal use of the drug. A mixture of one part of the salt in two parts of water is injected hot. From two to three grains of the salt are administered at a time. The injection is said not to be painful. It neither irritates the tissues nor causes induration. Riggs⁸⁸ treated haemorrhagic malarial fever without quinine, but with large and frequently repeated doses of arsenious acid,—from one-tenth to one-fortieth of a grain at intervals of three or four hours until one-half or three-fourths of a grain are taken. The symptoms subside within twelve hours. Upon convalescence, quinine, iron, arsenic, and nux vomica were administered. Caution is advised, lest gastric irritation or arsenical poisoning result.

Antony⁸⁰ successfully treated the continued forms of malarial fever, both at the beginning of the indisposition and in the cachectic period, with antipyrin, when quinine was manifestly without effect. He found it also to be an excellent auxiliary to quinine.

Luzzatto⁸⁰ treated malarial fever with carbolic acid, resorcin, and iodoform. Gram 0.5 of carbolic acid was given daily in divided doses to a male 17 years of age. A remarkable amelioration of the disease, attended with a great reduction of the temperature, at once took place. On the sixth day of the treatment with carbolic acid, the tenth of the disease, the temperature ceased to rise. The cure was lasting, as no relapse occurred. The rigor was much shortened and the free intervals became correspondingly longer. Two other cases were treated in the same way with similarly favorable results. In the cases treated with resorcin, the remedy was administered subcutaneously in three doses of gram 2.20. The action was almost identical with that of carbolic acid, and the author looks upon the two as analogous in their therapeutic effects. Iodoform shortened the rigor and moderated the temperature, but did not completely suppress the attack; nor did it in all cases always prevent relapse after the medicine was discontinued. In four cases treated, complete recovery took place under its administration. For the treatment of the splenic tumor resorcin and ergotine were injected together, with the gratifying result that a decided reduction took place in the size of the organ.

THE MALARIAL FEVERS.

(From the ANNUAL for 1889.)

The importance of the discovery by Laveran of parasitic organisms in the blood of malarial patients receives, year by year, additional confirmation. The varying appearances in the different forms of malarial fever and at different periods of the same disease are to be viewed as due to polymorphism of the active agent and as representative of various stages of its development, rather than as indicative of the existence of a number of distinct organisms. As to the precise biological position of the plasmodium, there is yet a little uncertainty. It is, however, recognized that we have to do with a low form of animal organism, parasitic upon man and capable of inducing profound deterioration of the blood, with secondary changes of a grave character. Of its life outside the human body and of the mode of its conveyance we know still less. That these are related to heat, moisture, and conditions of the soil there is abundant clinical testimony. These advances in our knowledge of the etiology of malarial affections have only served to strengthen confidence in the use of quinine as a curative agent, for observation has shown that this drug exercises a directly destructive action upon the *hæmatozoön*. We have thus been placed in the position of determining, by an examination of the blood, whether a given case of dubious nature is malarial or not, and of addressing our therapeutic measures accordingly.

Etiology.—Numerous papers on the condition of the blood in malaria have appeared. Among the articles on this subject especially worthy of note are those of Evans, ² Shattuck, ⁹⁹ Denian, ¹⁷ James. ⁵⁹ Baker ⁶¹ regards it as proved, so far as evidence is yet presented, that intermittent fever is proportional, directly or inversely, to the average daily range of atmospheric temperature, and that the controlling cause of intermittent fever is exposure to unaccustomed changes in the atmospheric temperature.

Pathology.—Henry ² records a case of “quintan” ague in a female aged forty-six years. The symptoms were typical, cold, hot, and sweating stages being well marked. The temperature rose during the cold and hot stages, reaching 105° F. (40.55° C.), and fell during sweating stage, being normal during the intervals.

The spleen was slightly enlarged; the other organs were normal. The interesting feature of the case was the rare interval between the attacks, namely, four days. Moncorvo⁸⁵ has studied the asthma occurring as a result of malarial intoxication in children and gives details of several cases.

McBride¹³⁹ has reported a case of periodical delirium from malaria in a child five years old. The child had eight or ten attacks of active delirium, with hallucinations of sight and hearing coincident with the malarial paroxysms. A perfect recovery was obtained under the use of quinine.

A. W. Reyes, of Sagua la Grande, Cuba,⁶ in a paper on "Rare Forms of Pernicious Fevers," directs attention to the occasional sudden occurrence of intestinal occlusion due to violent tonic spasm of the intestinal muscular fibres, which is sometimes associated with spasm of voluntary muscles also. In these cases there is great difficulty in arriving at a correct diagnosis, for the temperature is usually only slightly above the normal, the extremely prostrate, sometimes cyanotic, condition of the patient coming on very suddenly, and there being nothing to point to the malarial origin of the affection. Nevertheless, the rapid and powerful effect of quinine, especially if administered hypodermically, together with the exhibition of some alcoholic stimulant by the mouth, is, he considers, a pretty sure indication of the true nature of these cases.

Bouchard³ reported the results of some researches recently conducted by Mosse in regard to the urinary excretion in intermittent fever. He found glycosuria present in two instances among one hundred patients suffering from malaria. Polyuria is, on the contrary, common, and lasts for some days after the febrile paroxysm. His conclusions are as follow: 1. The urology of malaria needs revision. 2. Glycosuria may occur after a case of intermittent fever, but it is rare and usually transitory. 3. Glycosuria occurring under these circumstances depends upon some inherent condition of the individual or special state of the organism, either transient or permanent, such as arthritic diathesis, lactation, etc. 4. Telluric intoxication plays only a secondary rôle in the production of glycosuria in malarial cases. It is as liable to follow mild and transient cases of malaria as pernicious cases. 5. After intermittent fever, there is commonly, but by no means constantly observed, an acute transitory polyuria, the quantity of urine varying

from two and one-half to three and one-half litres (quarts) in twenty-four hours; it may reach five or even eight litres. This polyuria is analogous to the polyuria which occurs after acute febrile diseases.

P. M. Gubareff, ⁶_{Nov. 10} of the Sebastopol Naval Hospital, reports an interesting case of diabetes following, and apparently due to, repeated attacks of malarial fever.

Juliano ²²³_{Jan. 27} calls attention to the fact that paludism in individuals contracting venereal diseases is apt to produce, first, in the soft chancre, phagedena; second, in the blenorragia, gleet. Romanoff, of Vernyi, ¹⁰⁰_{Aug.} reports a case of rupture of the spleen in malarial fever. About two days after his admission into the hospital the man suddenly died, with all the signs of internal haemorrhage. At the necropsy the anterior surface of the spleen was found to be traversed by a rent six centimetres long, while its external aspect was crossed in various directions with twenty ragged fissures, varying in length from one-half to two centimetres.

J. G. Carageorgiades, of Limassol, Cyprus, collaborator, has found clinically and anatomically that in Cyprus malarial fever never causes abscess in the liver; this is fully in accordance with the observation of Dr. Sangarolla, of Alexandria, as regards Egypt.

Sacchi ⁷⁵_{Nov. 15} arranges the paralyses occurring in malarial diseases into three groups, as follows: 1. Paralyses which occur during paroxysms of simple intermittent fever and vanish with the paroxysms, frequently recurring in succeeding paroxysms. Intelligence is undisturbed. Rather a rare form. 2. The paralyses which occur in pernicious intermittent fever. They are associated with intense congestion and coma. They last throughout the attack and are prone to recur. Occasionally the congestion terminates in apoplexy. This is the most frequent form. 3. In rare cases paralyses occur in cachectic conditions of chronic malaria without other appreciable cause.

Treatment.—Kenner ²²⁴_{Jan. 7} contributed an important paper on the treatment of intermittent fever. The various forms of intermittent may be classed in this order: 1. That which is attended with a high degree of "biliousness." Here the compound extract of colocynth combined with calomel, given when the patient comes first under observation, is an important adjunct to antipyretic treatment. 2. A second group includes the cases in which the

symptoms of "biliaryness" are slight, or absent altogether. Quinine is here the specific. 3. A third group comprises the cases in which the paroxysms have continued to recur for a long time and a malarial cachexia is developed. The patients are those who have been exposed to the action of the malarial poison for a long period and have had paroxysms regularly every month. They are anaemic and usually have enlargement of the liver and spleen. Removal to a more healthful climate is imperative. The general health must be looked after. Cod-liver oil, arsenic, and iron yield the best results. 4. A fourth group includes those cases in which the paroxysms recur from habit. The patients have been exposed to the poison for a protracted period, usually without adequate treatment. Tonics are advisable, particularly iron, and iron in combination with arsenic. Agents that impress the nervous system are useful in resisting the paroxysm—cold baths or opium given before the expected chill have prevented its development. For the enlargement of the spleen, nothing is so good as tonics and the application of the ointment of the biniodide of mercury. The author alludes to the importance of the differential diagnosis of intermittent fever.

Pampoukis, of Athens,⁷³ states that new antipyretics, especially antipyrin and antifebrin, have been extensively used by the Greek physicians in malarial diseases with satisfactory results in shortening the duration and mitigating the intensity of the febrile stage. The author prefers antipyrin to acetanilide. On the other hand, Harley,²⁰⁸ who has employed the modern antipyretics in a large number of cases of remittent fever, regards antifebrin as superior to antipyrin, both in its greater power of reducing temperature and in the absence of after-effects.

Vogler⁶² recommends for the constipation in intermittent fever a powder consisting of calomel, four grains (0.23 gramme); ipecac, one grain (0.06 gramme); bicarbonate of soda, twenty-four grains (1.5 grammes); aromatic powder, twelve grains (0.77 gramme). Divide into twelve powders; give them as necessary. After the sweating stage is over he gives a pill of quinine, one and a half grains (0.98 gramme); capsicum, carbonate of iron, and nux vomica, each one-half grain (0.03 gramme); oil of cloves, *q. s.* Give one pill four or five times a day.

For the enlargement of the spleen he uses the biniodide of

mercury ointment, and rubs the abdomen with this every other day for about ten or twelve days, especially over the spleen.

Jacobi⁵¹ recommends quinine in the form of the neutral tannate, because it is tasteless and may be given in powder; but, for one part of the sulphate, two and a half of the neutral tannate must be administered. When it cannot otherwise be taken it may be given in the form of rectal injection. Acid is not here to be used; therefore very soluble preparations are employed, such as bromide, the muriate, the bisulphate, the carbamide. Suppositories are less effective. The applications of quinine ointment with lanolin or other fatty substances are not attended with very positive results. The carbamide may be given hypodermically. In the chronic forms arsenic is the principal remedy. The tincture of eucalyptus may be used. Ergot, long continued, constitutes the best remedy for splenic enlargement.

In the treatment of chronic malarial disorders, especially when nervous symptoms are prominent or anaemia is a serious factor, Solomon Solis-Cohen continues to derive the best results from the use of arsenic iodide, in doses of from one-twenty-fourth to one-twelfth of a grain (0.0027 to 0.005 grammes), three times daily. When there is distinct fever, or if muscular pains be present, he combines with it cinchonidine salicylate, from three to five grains (0.19 to 0.32 grammes). When there is much splenic enlargement, or if the region of the spleen be painful, inunctions are ordered of iodine in lanolin and vaselin, thirty grains (two grammes) to the ounce, with from ten to twenty drops of oil of gaultheria.

THE MALARIAL FEVERS.

(From the ANNUAL for 1890.)

Etiology.—Several valuable contributions have been made to the study of the hæmatozoa of malarial fevers. Celli and Guarneri,⁵⁴ published a very important contribution reviewing the work of Golgi, Councilman, Kenztsky, and Laveran. They classify the various forms of the parasite, so far recognized in malarial blood, under two stadia: (a) the amœboid stadium, or the stadium of the plasmodium (Marchiasava and Celli); (b) stadium of the sickle-shaped corpuscle (cystic bodies I, II, III of Laveran and Richard). The amœboid stage, in which the plasmodium goes through its intra-cellular life within the red blood-corpuses, may be divided into two principal phases,—the vegetative and the reproductive. The vegetative phase includes all the changes from the unpigmented form to that of the pigmented form which fills the whole red blood-cell. There appear to be two pigmentary substances; the one, which may be termed endoplasmic, is deeper-colored and includes the granules and rods of the black pigment, melanin; the other, the ectoplasmic, occurs usually in smaller masses much lighter in color. It accumulates in the centre of the quiet corpuscle or as a round mass at the periphery. The authors describe a process of sporulation analogous to that of the coccidia and mycetozoa, and another process concerning which they are in doubt whether it represents genuine sporulation or simply a destruction of the pigmented plasmodium. The sickle-form stage is divided by the authors into three principal phases: First, the crescentic, or sickle-form figure proper; second, the rod, or spindle form; third, the ovoid form, or round, flagellated form. A difference is noted in their relative frequency in summer and autumn, the crescentic bodies being more abundant in the latter season. They are also more abundant in recurrent cases and in chronic cachectics. The authors have observed destruction of the parasitic organism by the leucocytes. While not positively pronouncing upon the identity of the organisms of the two stadia, they deem it not unlikely. An important therapeutic point is that quinine, while active against

the first form, the plasmodium, may be perfectly harmless to the crescentic form ; and, indeed, they have found that it is in those cases most rebellious to quinine that the crescentic form is most frequently found. Clinical observations show also a class of malarial fevers with tendency to spontaneous recovery. This must be attributed to phagocytosis.

Golgi,⁵⁴ supplementing his previous observations, has studied the development cycle of the malaria parasite in order to determine the differential diagnosis between the endoglobular organisms of tertian and quartan fevers. He believes that the paroxysms of intermittent fevers are in direct relation with the development of generations of parasites; and that the different development periods of different broods are the conditions determining the differing periodicities of the recognized varieties of fever. He claims that the experienced observer can distinguish, by biological and morphological characteristics, those parasites which have a life cycle corresponding with tertian-fever periodicity, from those whose life cycle corresponds with quartan-fever periodicity.

In the development of the tertian-fever parasite three phases may be distinguished:—

1. In the blood examined some hours preceding a fever access, we find in the red blood-cells the so-called plasmodia of Marchiafava and Celli, of their minimal size, one-fourth to one-fifth that of a red blood-cell. Amœboid contractility is marked, and is one of the discriminating characteristics of the tertian-fever parasite as contrasted with that of quartan fever. Pseudopodia are actively sent forth, like an irregular system of septa in the red cells. The organisms contain little or no pigment.
2. In the course of the second day the parasites are observed to be larger, occupying one-half or two-thirds of the red globule. They have a better-defined outline and are much richer in pigment. Their amœboid movements are less active, though still more marked than can be observed in the similar phase of the quartan-fever parasite. The red blood-cells have suffered a marked loss of hæmoglobin, and this destruction progresses until the outline is barely distinguishable, the parasite meanwhile increasing in size and in melanin content.
3. When all the pigment has been gathered into the middle of the parasite mass, a peripheral differentiation begins to show. At first the pigment-containing central mass is surrounded by an

unpigmented ring in which radiation occurs, finally dividing the ring into a number of small globular masses, which continue to encircle the larger pigment-containing corpuscle. These little whitish masses become more and more individualized and more distinctly separated from the central body. The red blood-corpuscle continues to become fainter, and at last disappears. While the ultimate stage is not definitely made out, it appears to be the rupture of the central parasitic mass, setting free the pigment, while the new-formed, smaller cells invade the red corpuscles, beginning a new cycle of parasitic development. The author relates a case the obscure clinical features of which were explained by his discovery in the blood of the organisms of both quartan and tertian fever, those of the former being more numerous. In conclusion, he gives the following diagnostic points. *Biologic characteristics:* *A.* The malarial parasite of tertian fever completes its developmental cycle in two days; that of quartan fever in three days. *B.* The endo-globular amoeboid bodies of tertian fever show much more active amoeboid motion than those of quartan fever. In the latter these motions can be distinctly observed only in the first phase of their development, and never very readily. It is usually necessary to warm the preparation in order to excite them. With the tertian parasite, on the other hand, it is somewhat difficult to catch the ever-varying forms of the lively organism. *C.* The parasite of tertian fever decolorizes the red blood-corpuscles in an energetic and rapid manner, while in quartan fever the red cells retain their color in great degree up to the latest phase in their destruction. *D.* In quartan fever the affected corpuscles become shrunken, while in tertian fever, even when the normal corpuscles in the same preparations become crenated, the infected ones retain their regular outline, appearing even larger than normal. *Morphologic Characteristics:* *A.* In tertian fever the protoplasm of the parasite has a very much finer and more delicate appearance than in quartan fever. Its outline is more distinct. This difference is most marked in the first phase of both organisms. *B.* In quartan fever the pigment consists of much thicker rods and granules than in tertian. There is also a difference in coloration. *C.* In tertian fever the development is not so uniform and regular as in quartan fever, departures from the ordinary types being quite frequent.

Nikolai A. Sakharoff, of Tiflis,⁵⁸⁶ details some interesting observations on the haematozoön living in the blood of malarial patients. When examined just after a paroxysm, the blood proves to contain, in large numbers, peculiar amoeboid bodies having enormous dimensions, some individuals being as large as twenty red blood-corpuses put together, or even still larger. The parasite consists of an extremely fine, light protoplasm, containing numberless dark, roundish, equally-sized, sharply-contoured, mobile granules, and a uniformly-grayish nucleus as large as one or two blood-corpuses. As prolonged (ten hours) observations show, the haematozoön may undergo a most curious transformation. At this or that portion of the parasite there appears a protoplasmic process, which subsequently separates itself altogether to transform into a bright, homogeneous, grainless body, with exceedingly fine outlines. The size of such bodies greatly varies. In course of time some of them penetrate into red blood-corpuses, increase in size, develop pigment granules, and gradually pass into the ordinary adult form mentioned above; while other bodies, having a smaller size, coalesce to form threads closely resembling the spirochæte of relapsing fever, and differing from the latter only in their being somewhat thicker, and in their performing comparatively slower, wave-like movements. The intra-corpuscular haematozoa (which are identical with Laveran's malarial parasite) are said to be best examined in the blood taken from the spleen on the second day of the patient's apyretic state.

Lucas⁶ _{Dac. 1, 1888} reports a case of remittent fever, with pneumo-pleuritic complication, in which Laveran's corpuscles were observed in the blood.

Pathology.—Kalindero³⁴⁵ has studied the variations in the number of blood-cells during impaludism. He finds them much diminished, the white cells especially falling, after a febrile paroxysm, from their normal proportion of 1 to 330 to 1 to 800, or even 1 to 1000. When the spleen is enlarged the anæmia tends to become permanent; but medication, especially with quinine and pilocarpine, will reduce the spleen and increase the number of blood-cells.

Diagnosis.—Neely⁷⁴ reports 2 cases of malarial fever simulating puerperal septicæmia. Ferreira¹¹⁸ reports on impaludism in children as studied at Rio Janeiro. It is rare to find any case

of acute or chronic disease in a child which is not complicated with malaria. The author treats at length of the various typical and atypical manifestations, which he groups as follows: 1. Thoracic (asthmatic, bronchitic, broncho-pneumonitic). 2. Gastric. 3. Intestinal. 4. Cerebral (eclamptic, comatose, delirious, meningitic).

Treatment.—Jaccoud¹⁷ declares it to be an error to look upon the chill as the initial manifestation of intermittent fever. True, this is its apparent onset, but its real beginning is to be detected by an increased excretion of urea due to increased combustion. If the temperature be taken at rather frequent intervals, it will be found to rise, little by little, until, just before the chill, it reaches, say, 39° C. (102.2° F.). If the urine be divided into two parts, one comprising that of the twelve hours nearer the paroxysm, the other that of the twelve hours further from the paroxysm, the amount of urea in the former portion will be notably greater than that in the latter. The time elapsing between the real onset of the disease paroxysm, as shown by the urine, and the apparent onset manifested by the chill, varies with the febrile type. In quotidiants it is about two hours, in tertians six to eight hours, in quartans twelve to eighteen hours. This fact condemns the neurotic theories, and indicates a rational basis for the time of administration of quinine.

Assuming that six hours before the paroxysm is the best time for giving the drug, this will mean eight hours before the chill in quotidiants. In tertians the administration should be completed twelve hours before the expected chill; in quartans, fifteen to eighteen hours. The dose must not be improperly divided, so that one fraction has been eliminated before the other can take effect. If a gramme (15 grains) is judged necessary, it should be given in three or four doses, about fifteen minutes apart.

Joseph Jones, of New Orleans, La., collaborator, considers mercury, quinine, and arsenic the most reliable agents in the treatment of malarial fevers, such as are met with in the southern and southwestern States of the Union. Of these, quinine holds the first place. The indications may thus be formulated: (1) the arrest of the fever; (2) the prevention of the return of the fever; (3) the arrest and prevention of the characteristic lesions of the blood and organs; (4) the restoration of the blood to its normal condition; (5) the establishment of the normal functions of the organs affected by the malarial poison.

Ricchi² _{Appt.} reports on arsenic in the treatment of malaria. He has been able to test it on a large scale, having been in medical charge of the officers and servants of the Adriatic railway system for several years. His experiments were made in districts where the disease was particularly rife. Of 2501 men on whom the method was tried, 579 were suffering from acute and 1384 from chronic malaria. The remaining 538 were free from the disease, so far as persons can be, who live with scarcely any hygienic precautions in places where it is endemic. In the acute cases arsenic was of little use, but it gave excellent results in the chronic cases, and in the others it seemed to confer immunity, or, if they contracted the affection, it was of a mild type and easily cured with quinine. The men put on flesh, and lost the pallid, cachectic look characteristic of dwellers in malarial regions. According to Ricchi, there can be no doubt that "the daily administration of arsenious acid increases the resistance of the organism to the action of the microbes of malaria." The treatment must be methodically carried out,—that is, the drug must be given in time and continued as long as may be necessary.

McLaughlin¹² _{Mar.} believes that quinine is always indicated in haemorrhagic malarial fever. He gives it in free doses, and precedes its use, as in ordinary malarial fever, by one or more purgative doses of calomel, and is confident the physiological effects of the quinine are better obtained after the mercurial action. Nausea and vomiting call for the use of ice, small pieces of ice to be frequently taken. Failing in this, he would direct that hot water be sipped or drunk freely by the patient. Morphine sulphate, given hypodermically, will often quickly relieve the nausea and at the same time will relieve the restlessness which is so annoying to the patient. This remedy, however, is not without its dangers, and should be used sparingly, or not at all, in those cases which show a tendency to anuria. Diuretics of a mild character, those which do not irritate the kidneys, are valuable remedies. He has found that lager beer is one of the most valuable remedies of this class. It is efficient as a diuretic, without irritating qualities, a good tonic, safe stimulant, and fair hypnotic, and, above all, it is generally grateful to the patient and acceptable to the stomach when other remedies are not retained. Diaphoretics, especially when the action of the kidneys is sluggish

and the skin is hot and dry, are, he thinks, necessary to a correct treatment of this malady. Warm or vapor baths, warm packs, and the hypodermic use of muriate of pilocarpine are efficient agents. In the convalescent stages the continued use of quinine in small doses, with iron, and perhaps strychnine, is demanded. The manifest tendency to relapse, so characteristic of this disease, and frequently so fatal in its results, should never be forgotten. In a large majority of the fatal cases of hæmaturia, death has resulted from suppression of urine. When this condition has existed for forty-eight hours, death almost invariably is the result; hence the importance of not overlooking the kidney-lesions of this disease. Digitalis is advised when the pulse is feeble, rapid, or dicrotic.

THE MALARIAL FEVERS.

(From the ANNUAL for 1891.)

Etiology.—Laveran ⁴⁵⁷_{Nov., '89} describes the various forms of organisms found in the blood in cases of malarial infection. The most common are colorless, transparent, spherical bodies of variable size, the largest having a diameter as large as or slightly larger than red corpuscles, capable of amœboid movement, free or adherent to red corpuscles, and usually containing granules of pigment. Attached to the spherical bodies or free in the blood are delicate, tenuous bodies,—flagella,—difficult of detection in repose, but more evident when engaged in active movement. The crescent-shaped bodies are free, transparent, colorless, having a length a little greater than the diameter of a red corpuscle, and contain, usually at their centres, granules of pigment. The extremities of the crescents are sometimes united by fine lines. In addition to the preceding, spherical bodies, pigmented at the centre, and regularly segmented rosettes are sometimes found in the blood of malarial patients.

Laveran, ³_{June 25, July 9}, in discussing the question as to the plurality or the polymorphism of the organisms of malaria, presented various objections to the former view. Based upon his observations, Laveran believes the organism polymorphous, but single, and its evolution not always the same. The crescents appear in old cases,—in those who have had several attacks or present the malarial cachexia. The type of fever depends upon the condition of the subject, his excitability, his tolerance of the miasm, and upon the form of parasite in the blood. Certain analogies exist between the hæmatozoa of birds and those of malaria, both probably belonging to the same species. Their identity, however, is doubtful, presenting, as they do, various morphological differences. Laveran was not able, by repeated examinations, to find hæmatozoa in the blood of birds which received intra-venous injections of blood containing large numbers of malarial organisms.

Of 85 cases of malarial fever, Terni and Giardini ⁹¹⁹_{May 16} found

crescents in 62 of irregular course, while in but 1 did they find the parasite of tertian fever described by Golgi. The crescents were present in 12 cases of malarial cachexia, in 1 accompanied by the parasite of tertian fever. In the remaining cases—9 of quartan and 2 of tertian—they found exclusively the respective organisms described by Golgi as characteristic of these fevers. Quinine proved efficacious in the last only. In cases in which these were associated with crescents, active treatment with quinine caused only the disappearance of the former. The unavoidable deduction is that the crescents can always be found in cases of malarial fever of irregular type.

Marchiafava, ⁸⁴ at the Second Congress for Internal Medicine, at Rome, observed that the results of examinations of the blood in cases of malaria varied with the season. In summer, the parasites appear in the red and in the white corpuscles. The pernicious character of such cases is constantly associated with the presence of many amoeboid bodies; in autumn, in addition to the latter, semi-lunar and filiform, ovoid and round parasites are found. The latter seem to be related to one another, representing various stages of the same organism. The amoeboid bodies occasion fever of a diurnal type, or sub-continuous fever. The presence of the semi-lunar parasite does not give rise to fever, although the general condition of the patient is poor, and improves only upon the use of iron and quinine. In winter and spring, the amoeboid body predominates. These cases recover spontaneously. Marchiafava and Celli have observed that at these seasons the amoeboid parasite shows a tendency to disappear, either by phagocytosis or by disintegration. Melanæmia is the result of the influence of the parasites upon the haemoglobin. The malarial parasite is a protozoön, and approaches in character the matozoa; malaria is induced by its invasion. This can be demonstrated by transmission of the infection through the blood.

Golgi, ⁸⁴ at the Thirteenth Congress of Italian Medical Associations, described the following febrile varieties of malarial fever: 1. Intermittent fever, dependent upon a parasite with a period of development of two days,—tertian and quartan. 2. Intermittent fever dependent upon a parasite having a period of evolution of three days,—quartan, double quartan, triple quartan. 3. Intermittent fever dependent upon the presence in the blood of parasites,

the significance of which has not yet been determined, which are developed periodically, and are known as semi-lunar bodies,—fever of indefinite intermittent type, with long intervals, daily and sub-continuous forms.

Diagnosis.—Osler⁷⁶⁴ insists upon the diagnostic value of the presence of the corpuscles of Laveran in cases of malarial fever. In ordinary cases of intermittent fever, there is no difficulty in the diagnosis. The examination of the blood is particularly valuable in chronic and anomalous cases. The following are the most important facts concerning the organisms: In the acute forms of malaria there exist, within some of the red blood-corpuses, amoeboid bodies, usually pigmented, which undergo a definite evolution, increasing in size, gradually filling the corpuscles, and which, prior to and during the chill, undergo a peculiar segmentation. In some cases there are also free, pigmented bodies. To the form within the corpuscles, which undergoes changes, the name plasmodium has been applied. Occasionally, in acute cases, flagellate bodies are seen free in the blood, presenting from three to eight long, actively-moving cilia. According to Councilman, these are much more common in the blood withdrawn from the spleen. In more chronic cases, particularly in the forms of remittent fever, which are so apt to be taken for typhoid, the corpuscles do not so often present the intercellular forms, but there are remarkably ovoid, rounded, and crescentic bodies, deeply pigmented. These are, in all probability, related to and developed from intercellular forms. From certain of these, particularly the ovoid and rounded forms, the flagellate bodies may be seen to develop.

Brandt⁸⁹ reports a case of much interest from a diagnostic point of view. In consequence of grave cerebral symptoms, with evidence of previous injury to the head, the question of surgical interference arose. The detection of the parasite in the blood, however, cleared up the diagnosis, and energetic antimalarial treatment dissipated the symptoms. In other cases of coma, in which the diagnosis was in doubt, the detection of the organisms in the blood excluded other possible conditions. In still another case, the dissipation of the malarial fever revealed the existence of typhoid fever. The blood was examined in a number of cases known not to be malarial, but organisms were never found.

Complications.—Boinet and Salibert,⁹² Nov. 10, 1899, during a sojourn of

three years at Tonkin, observed a number of motor disorders of malarial origin: malarial paralyses proper; spasmodic affections, as tremor, choreic and ataxic movements; athetosis, convulsions, contractures, and muscular atrophy.

Malarial paralyses are transitory or permanent; the former always yield to quinine. They appear with the onset of fever, disappearing with it, or persisting a few days longer. They have the characters of cortical paralyses, rarely of spinal palsies. Permanent paralyses of malarial origin are not amenable to treatment by quinine, being the results of organic lesions of the nervous system. Spinal lesions are often accompanied by disorders of sensibility, sometimes by muscular atrophy, or even by tremor. Aphasia sometimes occurs in association with cortical paralysis of malarial origin. It is frequently associated with hemiplegia, monoplegia, or paraplegia. When there is hemiplegia or monoplegia, the paralysis usually is limited, complete, transient, easily cured, not progressive, variable in seat and intensity, of cortical origin. From these there may be various deviations. Aphasia may be accompanied by manifestations of spinal involvement, by paraplegia. In the case of the transient palsies, it is conceived that occlusion of a cerebral vessel by micro-organisms has taken place. The changes in the spinal cord due to malaria may be congestion, inflammation, softening or haemorrhage. The latter is rare, and is probably due to the rupture of small vessels or of miliary aneurisms. Clinically, the paraplegias resulting from these conditions may be accompanied by muscular atrophy and cutaneous anaesthesia, or by tremor of the inferior extremities and of the head on voluntary movement. The paralysis may remain permanently; it may undergo improvement; it may be but transient; it may be repeated.

As a result of malarial intoxication, there may be rhythmical movements, in the form of tremor on voluntary motion. Sometimes the movements are choreic, sometimes ataxic. More rarely there is athetosis or spasmodic contractions. Finally, there may be convulsions or contractures. Muscular atrophy, in the course of malaria, may be spinal or peripheral. In the former case, a large number of muscles are affected. The symptoms and lesions are comparable to those of anterior poliomyelitis. If the atrophy be peripheral, it is limited to the distribution of one or more nerves.

Harlan ^{Aug. 7}²⁹ presented to the American Ophthalmological Society the history of a case of malarial cachexia with transient amblyopia and bitemporal hemianopsia. A sailor, aged 22, with chills, fever, headache, mania, and hallucinations, which failed to submit to quinine, lost vision in the temporal fields, and subsequently became entirely blind. Pigmented corpuscles were found in the blood. Continued administration of quinine caused rapid improvement, with return of normal vision and disappearance of the pigmented bodies.

Rouzier ^{Aug. 12}¹⁷ has collected a large number of observations of mild impaludism, in which a distinct systolic murmur was heard with greatest intensity at the apex, and not transmitted in the course of the vessels, in cases in which functional derangement and antecedent cardiac disease could be excluded. In 2 cases under observation for a considerable length of time, the murmur became progressively fainter. Post-mortem lesions are not often found. In cases, however, there have been alterations of volume, of consistence, of coloration of the cardiac muscles, hypertrophy or degeneration, exceptionally valvular lesions. Nicoletti ⁵⁸⁰_{Nov. 28, '91} reports a case of spontaneous rupture of the spleen in a boy of 15, who had had repeated attacks of intermittent fever. While engaged in his work, which consisted in carrying heavy weights up a steep plane, the boy felt a sudden, sharp pain in the left hypochondrium, fell to the ground, and died in twenty minutes. At the post-mortem examination, a large quantity of bloody fluid was found in the peritoneal cavity, and in the left hypochondrium a clot as large as a child's head, surrounding the spleen, which presented a laceration at its anterior margin. The organ weighed 680 grammes (22 $\frac{1}{2}$ ounces). Its pulp was extremely friable.

Masked Intermittent Fever in Children.—Lewis ¹¹²_{Mar.} calls attention to masked intermittent fever in children, presenting itself in the form of bronchitis. A certain number of the cases were at first treated with chloride or carbonate of ammonium with little benefit, while immediate relief followed the administration of quinine, which, given tentatively to cases of ordinary bronchitis, produced no decided benefit. Many of these children had slightly enlarged spleens, and were quite pallid. Fever was recognized in only a few of the cases, while slight chilliness was more common. No distinct intermission in the bronchial symptoms was noticed. The

haematozoa of malaria were looked for in only a few cases, but were not found. In some of the cases, the diagnosis was arrived at only after careful investigation, aided by the fact that the majority came from a known malarious neighborhood.

The Urine in Malarial Fevers.—At a meeting of the Société des Sciences Médicales de Lyon, Roque and Lemoine²¹¹ reported the results of examinations in 3 cases of impaludism to determine variations in the toxicity of the urine. One case was a frank tertian, the other 2 were pernicious comatose forms. Death occurred in one of the latter during a paroxysm. In the case of tertian fever, examinations on three occasions of the urine, passed during twelve hours preceding the paroxysm, revealed a normal or subnormal urotoxic coefficient, while the urine passed during twelve hours following a paroxysm was hypertoxic. The urine passed during the first six hours following a paroxysm possessed a higher toxicity than that of the second six. The highest coefficient was obtained in the urine after the last paroxysm, eight hours in anticipation of which 23 grains (1.50 grammes) of quinine had been given. The other 2 cases had come from Algiers. In both, the urine contained albumen. The occurrence of these pernicious forms in those returning from paludal to cold climates is ascribed to diminution of the cutaneous functions. In addition, the renal lesion probably aggravated the condition by further diminishing the elimination from the blood of toxic matters produced by the paludal poison. In the 2 cases in question, the toxicity of the urine was at first *nil*. Subcutaneous injections of quinine, which produced permanent amelioration in one and only passing mitigation in the other, were followed by a hypertoxicity of the urine. As a result of their observations, Roque and Lemoine formulated the following conclusions: The paludal poison gives rise to toxic products in the blood, a large portion of which is eliminated by the kidneys. Elimination is at its maximum immediately after a paroxysm, and lasts, on an average, twenty-four hours, at least, in cases of tertian fever. Quinine acts in favoring and augmenting this elimination. In certain pernicious forms, without toxicity of the urine, dependent upon lesions of the kidney and of the liver, a return of urinary toxicity is of favorable augury. Recovery is preceded by an elimination of toxines in excess of that which occurs after an unintercepted paroxysm.

Treatment.—Charpentier⁸⁴⁵ makes the following suggestions as to the administration of quinine in intermittent fever: As the action of quinine takes place six hours after administration, to obtain the maximum effect of a given dose, it should be given six hours before the attack. In quotidian fever the apparent onset of the attack is marked by the chill, but the actual commencement occurs two hours earlier. It would, therefore, be a mistake to administer quinine six hours before the chill. The right time would be about eight hours in anticipation of the chill. The varying length of the interval between the apparent and real commencement of the attack in the various forms of intermittent fever gives rise to the following rules: In quotidian fever the quinine may be administered eight hours before the chill; that is, immediately at the close of the preceding attack. In tertian fever the quinine may be administered twelve hours before the chill. In quartan fever the quinine may be given eighteen hours before the chill.

Quinine should be prescribed in large doses, as it is speedily eliminated by the urine. In case the stomach will not tolerate large doses, fractional doses may be given at brief intervals, so that the entire amount is taken in three quarters of an hour, or an hour at most.

Bacchelli, ⁸⁴ at the Second Congress for Internal Medicine, at Rome, stated that certain pernicious forms of malaria were fatal, despite the utmost care. For these he proposed the intra-venous injection of a neutral salt of quinine:—

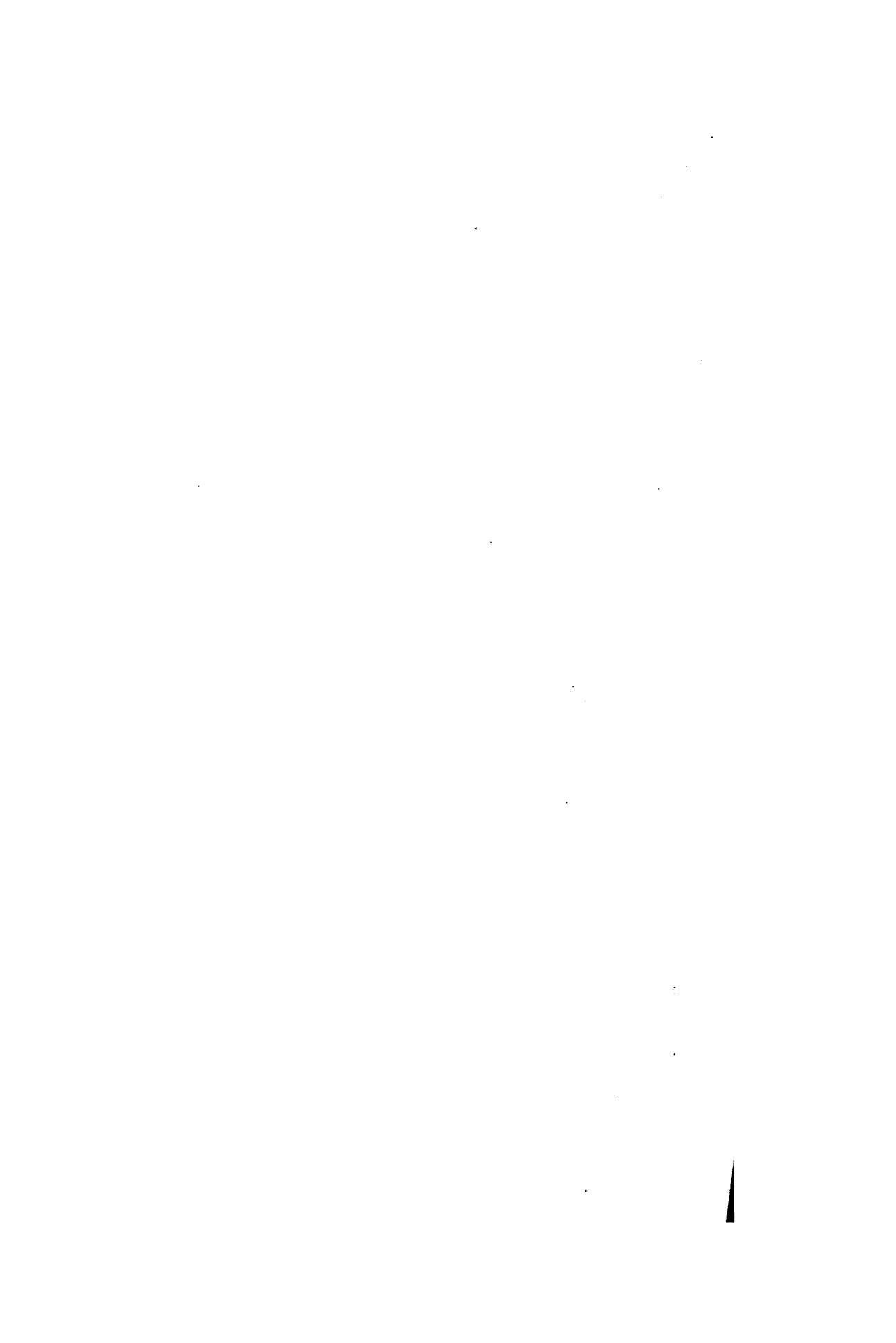
R Quininæ hydrochloratis, gr. xv (1.00 grammes).
Sodii chloridi, gr. j (0.07 grammes).
Aqua destill., fliiss (10.00 grammes).—M.

This was injected into the veins in progressively diminishing doses. There were no untoward results. On the contrary, the pernicious character of the disease was dissipated.

A dose of 15 grains (1 grammes) of quinine does not suffice to abort a paroxysm when given at the outset or three hours before. Given at the height of the paroxysm, the quinine does not shorten the attack. Given at the close of, or after the paroxysm, quinine aborts the subsequent attack or diminishes its intensity in a marked degree. In the subcontinuous varieties, that time is the best for administering quinine at which a reduction of temperature has taken place.

Hunter, of New Orleans,² insists upon the efficacy of nitrate of potassium in the treatment of chills and fever. He claims to have cured 65 per cent. of his cases with a single dose; 35 per cent. were uninfluenced by repeated doses. The best results were obtained when the drug was administered during the premonitory stage, in anticipation of the paroxysm. It is said that 25 or 30 grains (1.63 to 2 grammes), given at this period, will abort the attack or modify its course and intensity. Sawyer¹, claims to have antedated the recommendation of Hunter by twenty-five years. He was induced to try the remedy after having been assured by a backwoodsman that a large dose of gunpowder (taken in whisky), at the beginning of the cold stage, would almost always abort or modify the malarial paroxysm, and attributed the result to the action of nitrate of potassium.

Johnson¹⁹ reports a case of quotidian intermittent fever, in a man of 44, which resisted treatment with quinine, 3 grains (0.20 gramme) every three hours, preceded by a mercurial purgative, but submitted to 15 grains (1 gramme) of nitrate of potassium every three hours.





Malaria. (Romanowsky.)

Fig. 1. Free Parasites. Fig. 2 to 6. Intracorporeal Parasites in various Stages of Development.
 Fig. 7 to 8. Mature Intracorporeal Parasites. Fig. 9 to 12. Parasites in Process of Division (Karyomitosis).
 Fig. 13 to 16. Changes in Intracorporeal Parasites after the Administration of Quinine.

St. Petersburg Med. Wochenschrift.

THE MALARIAL FEVERS.

(From the ANNUAL for 1892.)

Romanowsky,²¹ ~~Aug. 24, 1891~~ by a special method of staining, was able to distinguish the structure of the organism and to discern progressive changes in the nucleus attendant upon the growth and development of the parasite of malaria, as well as regressive changes induced by the administration of quinine. The administration of a tincture of helianthus (sunflower) seemed to retard the development, but failed to cause destruction. Quinine may thus not only empirically, but also biologically, be considered a true specific in malarial fever.

Prout⁶ ~~Aug. 1~~ describes the malarial fevers prevalent on the Gold Coast of West Africa. Well-marked intermittent fever is quite rare. The natives and Europeans that survive the first few years of continuous residence display a very mild type of fever, characterized by sudden onset, headache, pains in the loins and limbs, a sense of discomfort, dryness of the skin, and a feeling of intense heat, followed by copious sweating. The disease is readily controlled by mercury and quinine. In recent arrivals the first attack is usually of considerable severity, partaking of the characters of bilious remittent. A cold stage is usually not observed. The temperature rises rapidly, soon declining. Pains in the loins and extremities occasion much discomfort and restlessness. The tongue is heavily coated; nausea is invariably present; vomiting often constitutes a dangerous symptom. The spleen is enlarged and tender. Recovery is gradual and tedious. Malarial haemoglobinuria occurs.

In Europeans who may be debilitated and anaemic from previous attacks of fever, as a result of anxiety, or overwork, or excesses, the attack sets in quite suddenly, perhaps with shivering. Vomiting occurs early, and is a prominent and intractable symptom. If subsequently the temperature continue to rise, without remission, the prognosis is unfavorable. The urine is diminished

in quantity and is porter-colored: it contains albumen and blood-pigment and pigment-casts, but few or no blood-cells. If recovery is to ensue, the symptoms gradually improve. On the other hand, the symptoms may become aggravated; the urine may be suppressed, and death may result from uremia. In 8 of 10 cases in which the blood was examined the red corpuscles contained brightly refracting, rod-like bodies, of varying number and size, presenting pulsatile movement; brightly refracting round spots, of different sizes, sometimes in association with the rod forms; large circular bodies, resembling vacuoles, lying either in the centre of the corpuscle or at its periphery, also sometimes in association with rods; and irregular transition forms. Three cases presented bodies in appearance resembling tadpoles or spermatozoids and possessing a limited power of movement. In 5 cases pigmented bodies were observed; small corpuscles, about as large as leucocytes, containing dark-brown granules, evenly distributed; bodies two or three times as large as the preceding, containing similar granules of pigment, but arranged around clear spaces; finely pigmented bodies, possessing amœboid movement; and amœboid bodies, containing large masses of black pigment.

Nepveu ²² found five organisms in the blood of malarial patients in addition to those already known: A biscuit-shaped bacterium, a paludal streptococcus, a buoy-shaped bacterium, a spirillum, and a keel-shaped bacterium. Nepveu has also found sporules in the intestinal villi, ovoid spores, asteroid amœboid bodies, spherical bodies, club-shaped bodies, some with flagella in the blood, and sickle-shaped bodies in the kidneys, liver, and spleen. A second variety of hæmamœba, smaller than that described by Laveran, was also observed. Sakharoff ²³ has detected, in the blood of patients suffering from irregular malarial attacks, small, pale bodies that are not found in the blood of those presenting malarial manifestations of regular type. These bodies are inclosed within the blood-corpuses, and are endowed with amœboid movement. In the course of development pigment-granules appear; motility is gradually lost, and a round shape is assumed. The granules accumulate at the side or at the centre of the parasite, and the nucleus, previously visible, becomes indistinguishable. The parasite meanwhile increases in size, though it never becomes as large as the blood-corpuse in

which it is contained. By and by, fission takes place. At its conclusion the segments, from four to sixteen in number, escape, and remain free or are taken up by leucocytes. Sometimes the course of development is more rapid, and fission begins before the formation of pigment. At other times new crescentic forms appear, and the disease assumes a chronic course. Sakharoff expresses the opinion that, in cases in which the crescentic bodies occur, the fever seldom assumes a recurrent type. He considers the crescentic as undeveloped bodies, although the amoeboid parasites may be present in large numbers from the beginning. The former may be found in the blood of patients having irregular malarial attacks, but they are seldom observed in the course of regular malarial manifestations. The crescents are gradually transformed into oval or round bodies. Generally some of the round bodies develop motile filaments; ultimately they disappear and leave no trace. Attempts to cultivate the parasites have failed. Fowls have proved insusceptible to inoculation. Although fowls are said to suffer from malaria, the parasite has not been found in their blood. A hitherto undescribed spiral parasite has been found in the blood of some geese in a highly malarious region of the Caucasus.

Okuneff⁹⁰ has recorded the results of a series of 63 careful observations, in 19 cases of quotidian and 5 of tertian intermittent fever, to determine the variations in the blood-pressure, in the cutaneous and internal temperature, in the pulse and respiration, and in the cutaneous and pulmonary transpiration during the stages of rigor, of fever, and of sweating. At the beginning of the period of rigor the blood-pressure usually falls, subsequently to rise again to the maximum. In the stage of fever the tension oscillates above the normal, though not rising so high as in the period of rigor, subsequently to fall to or below the normal; in the stage of sweating the pressure falls below the normal, sometimes considerably. As a rule the pulse is most frequent during the period of fever, with moderate elevation of the arterial tension. In a certain proportion of cases, however, the maximum acceleration may take place in conjunction with the highest degree of tension (in the cold stage), or with the lowest degree (in the sweating stage). There is no apparent parallelism between the frequency of breathing and the course of the bodily temperature.

The axillary temperature rises in the cold stage, attains its maximum in the hot stage, and returns to the normal in the sweating stage. The rectal temperature is commonly from 0.1° to 1.5° C. (0.18° to 2.70° F.)* lower in the cold stage than is the axillary temperature. In the hot stage the rectal temperature is from a few tenths of a degree to a degree higher than the axillary temperature, while in the sweating stage the former is from 0.6° to 1.6° C. (1.08° to 2.8° F.) higher than the latter. In the cold stage the cutaneous temperature of the abdomen and chest remains either normal or subnormal, but in the hot stage it rises above the normal, to return to the normal with the onset of sweating. The femoral temperature remains normal during the cold and hot stages, but falls below the normal in the sweating stage. In the stage of chill there is diminished cutaneous and pulmonary transpiration. This begins to increase in the hot stage, and increases still more in the sweating stage.

Golgi⁵⁸ claims to have been the first to demonstrate that the different forms of parasites observed in the blood of individuals suffering with malarial disease are but modifications of one form, and that these metamorphoses follow one another according to a fixed law. The development takes place in and leads to the destruction of the red corpuscle. The amœboid parasite, at first small and unpigmented, increases in size at the expense of the red cell, becomes pigmented, and, after passing through a series of metamorphoses, finally multiplies by segmentation. The process of segmentation corresponds with or slightly precedes the onset of the febrile paroxysms. The pigment-granules contained in the body of the parasite do not participate in the process of segmentation, on the completion of which they are set free in the blood-current, to be taken up by the white blood-cells and the cells of the liver. The period of time that elapses between the entrance of the parasites into the red blood-corpuscules and their segmentation constitutes the apyretic interval. It is thought that tertian fever depends upon the presence in the blood of a distinct variety of parasite, the development of which occupies two days.

Laveran^{3, 20} states that the blood should be examined with the onset of fever. The patient should not have taken quinine for some time previously. The blood may be examined in its recent condition or it may be dried. It is obtained by puncture

of a finger previously washed; for the purpose a needle sterilized in the flame of a lamp is employed. The drop of blood that appears after the puncture has been made is received upon a cover-glass, and is distributed in a thin layer by means of a second cover-glass placed upon the surface of the first. The examination is preferably made by daylight; a good dry objective is sufficient with which to recognize the parasites. The flagella are most often observed at the borders of the free, pigmented, spherical bodies. To examine the dried blood; one cover-glass is slipped over the other and the blood is permitted to dry; the cover-glass is then passed three times through the flame of a spirit-lamp. If the specimen is not stained the crescents may be detected; but, in order to see the spherical bodies, it is necessary to treat the cover-glass with equal parts of alcohol and ether, then to stain with a concentrated solution of methylene blue, to wash in water, and to dry. In blood prepared in the manner indicated the nuclei of the leucocytes are colored deep blue; the spherical bodies, pale blue; while the crescents are scarcely stained. Examination of fresh blood permits only of the detection of flagella, and, if one is familiar with the haematozoa, gives the best results; but the examination of the dried and stained blood is easier, while the preparations are permanent.

Toulmin⁹ Sept. 19 emphasizes the clinical importance, for purposes of diagnosis, prognosis, and treatment, of examinations of the blood to determine the presence or absence of the organisms of malaria, and fortifies the position he takes by a recital of cases, the true nature of which, without such examinations, might have remained doubtful if not unrecognized.

Joseph Levi, corresponding editor, Colon, ⁶⁷³ June, July describes the types of malarial fever observed at the Isthmus of Panama, in the order of their frequency, as intermittent and remittent fever, chronic malarial toxæmia, and pernicious malarial fever. New arrivals usually succumb to the last. Pernicious malarial fever is only less dangerous than yellow fever, for which it is not rarely mistaken. The manifestations of chronic malarial toxæmia are most diverse. Among other manifestations are enlarged spleen, anæmia, and a pale, dirty-yellow complexion. There is slight jaundice, together with various neuralgias. For most of the cases the only remedy is change of climate. Women present amenorrhœa, dys-

menorrhœa, ovarian neuralgias, and hysteria, as sequelæ. The prognosis is governed by the previous condition of health and by the mode of living. Quinine is the only reliable remedy. It occasionally fails,—for instance, when large doses have been taken prophylactically. Exceptionally, too, an idiosyncrasy may be encountered, rendering the employment of quinine out of the question. The following formula is recommended, the bowels having been previously acted upon:—

R	Quininæ sulphatis,	gr. v	(0.32 gramme).
	Pulvis pepsini porci,	gr. iiij	(0.19 gramme).
	Pulvis capsici,	gr. ss	(0.032 gramme).
	Pulvis zingiberis,	gr. j	(0.065 gramme).
	Sodii bicarbonatis,	gr. v	(0.32 gramme).

M. Fiat pulvis.

Sig.: To be taken every half-hour or hour, as required, until the fever subsides. Subsequently, half of the quantity is to be given every two or three hours.

An occasional hypodermatic injection of $\frac{1}{2}$ grain (0.0081 gramme) of morphine is beneficial. The tenderness over the spleen is relieved by inunctions of the ointment of the red iodide of mercury. In chronic cases iron, quinine, and arsenic are indicated. Potassium permanganate is often of service, especially in females with menstrual derangement. The death-rate among children is highest before the period of dentition. Subsequently, tolerance or resistance to infection seems to be established. In many cases general anasarca develops. Quinine alone is insufficient in treatment. When serous effusions have taken place tapping, followed by the administration of infusions of buchu and of digitalis, is useful. In many cases hydrocele is thought to be related to malarial infection. The best results are obtained by injections of port wine. Haematuria is to be treated with tannin and quinine, administered alternately.

Delmas²¹³ divides the malarial remittent fever of Algeria into a mild and a grave type. Both of these may be subdivided into forms in which general and local symptoms respectively predominate. The ordinary form of remittent fever belongs to the mild type, and is characterized by a predominance of constitutional symptoms. Local manifestations of mild remittent fever may be especially referable to the digestive, the respiratory, or the locomotive system. The digestive derangement may partake of a gastric or of a bilious character. The gastric symptoms may be mild or

grave. The respiratory symptoms are principally bronchial, and the locomotive are rheumatoid. The last may be muscular, fibro-muscular, or articular. The grave type of fever in which constitutional manifestations predominate may be characterized by hyperthermia, by adynamia, or by a typhoid condition. When local manifestations predominate in grave remittent fever, the symptoms may be especially referable to the cerebro-spinal, the digestive, the respiratory, the circulatory, or the locomotive system. The symptoms of the cerebro-spinal type of fever may be cerebral, bulbar, or meningeal. Among cerebral symptoms delirium or coma may be conspicuous. Bulbar involvement is manifested by syncope. The digestive type of fever may be further subdivided into a dysenteric and an hepatic form; the respiratory, into a pneumonic or a pleuritic. Hepatic remittent fever may be of inflammatory or of icteric type. Pneumonic remittent fever may be subdivided into a croupo-pneumonic and a broncho-pneumonic type, and the latter again into a catarrhal and a suffocative. The circulatory type is characterized by cardialgia, the locomotive by rheumatoid pains and grave complications.

James ¹ _{Apr. 25} reported the results of examinations of the blood in 400 cases regarded as of malarial origin. The cases presenting an intermittent type of fever, in which malarial organisms could not be found, proved, on further observation, or at autopsy, to be other than malarial; those cases, on the other hand, in which plasmodia were found in the blood, presented a striking uniformity of symptoms, with evident enlargement of the spleen. In 98 per cent. of the latter cases there was a history of exposure to miasmatic infection. In only a few severe cases presenting a remittent type of fever could plasmodia be found; these cases had been exposed to malarial infection. In the milder, more irregular, indigenous cases, organisms could not be found in the blood; nor was the spleen, with any constancy, enlarged. In cases of non-malarial disease, in which there was, nevertheless, a possible malarial element, plasmodia were found in but a single instance. In none of the cases of headache, neuralgia, malaise, etc., of a periodic tendency, were plasmodia found. In the discussion Delafield stated that, in New York, patients are seen with fever that is not typhoid or typhus, or that is not dependent upon tuberculosis or upon inflammation in any part of the body. Such persons suffer from fever as a

disease. Some have distinct paroxysms, characterized by daily fever and sweating, occurring at regular intervals, either every day, every other day, or every third day. Such cases are much less common than they were a few years ago. Other cases present paroxysms of fever not preceded by chill, or necessarily followed by sweating, the intervals being the same as in the preceding variety, and the attacks being characterized by high temperature. Other cases present a continuous fever, lasting about two weeks, with a well-marked febrile movement, headache, and more or less prostration. Such cases always recover perfectly, but they are difficult to distinguish from cases of typhoid fever. Some other cases present a fever coming and going, seldom lasting twenty-four hours, and the temperature never ranging very high. The fever might continue for a week or two, every day or every other day; but there is no regular order for the attacks, which may go on for months or years. These fevers behave capriciously to remedies. In some instances quinine is effective and in others useless; in some Warburg's tincture does good, while in others it causes nausea and gives rise to diarrhoea. Arsenic is also uncertain in action. The patients do best if sent out of the city, but recurrence is probable on their return. It is imperative to recognize that there are fevers that simply give rise to fever; there is a great deal lacking in the matter of treatment, but it is clearly wrong to go on dealing with the cases as if they are all of purely malarial origin.

Torti and Angelini⁵⁸⁹ June 26 have reported the occurrence of symptoms of cerebro-spinal sclerosis in 2 young men suffering from chronic malarial poisoning. On examination of the blood many malarial parasites were found. A course of quinine and arsenic was followed by recovery. Celli⁸ Nov. 27, '90 emphasizes the desirability of careful statistical data as to the geographical distribution of malarial disease.

Hochsinger¹¹³ No. 17 has succeeded in finding the plasmodia of malaria in 24 cases of malaria in children, who are especially prone to malarial infection during the first two years of life. The disease pursues an atypical course, and is rarely diagnosticated. The initial chill is never observed; sweating is usually wanting, the intermissions are ill-defined. A child suffering with malarial fever runs down in health, develops a sallow complexion, becomes anaemic, and loses flesh,—symptoms that may spontaneously dis-

appear, but that are speedily removed by the administration of quinine. To examine the blood for plasmodia, cover-glass preparations are made, dried in the air, and subsequently fixed by immersion for half an hour in a combination of equal parts of alcohol and ether. The preparations are then stained by means of a solution consisting of about 3 ounces (93 grammes) of concentrated aqueous solution of methyl-blue, to which a few drops of absolute alcohol and then $7\frac{1}{2}$ grains (0.54 gramme) of eosin dissolved in water are added. The solution is sterilized by boiling, and preserved in a tightly-corked bottle. For use, a small quantity is filtered into a watch-glass, and the prepared cover-glass, inverted, is permitted to float on the surface for at least ten or fifteen minutes after the solution has been previously warmed. The cover-glass is next washed in water, dried between filter-paper and then over a spirit-lamp, and finally mounted in Canada balsam. The red blood-cells are stained rose, the nuclei of the leucocytes a very dark blue, and any plasmodia that may be present are stained a delicate sky-blue. Segmented amœboid bodies were never absent in infants. The plasmodia were sought for, but were never found in other than malarial diseases.

Atypical Forms.—Humphreys⁸⁵ reports that a certain number of cases recognized as malarial do not bear quinine well. In them an intermittent or remittent fever, if permitted to run its course, becomes continuous and often pernicious. If quinine be administered to cinchonism, the fever assumes a milder type, or haematuria develops; but, if the quinine be withdrawn, the paroxysms cease and the temperature declines. Subsequently, a tea-spoonful of spirits of nitrous ether and 2 or 3 grains (0.13 to 0.19 gramme) of potassium chlorate are administered alternately every two or four hours.

Complications.—Diberoor³⁶³ _{Feb. 21} has recorded 2 cases, characterized by ulcer of the tongue, which obstinately resisted both dietetic and local treatment. The possibility of the dependence of the lesion upon malarial infection suggested the employment of quinine, following which the ulceration rapidly disappeared.

Dwight¹ _{Jan. 10} has reported an epidemic of disease, presumably malarial, in which the cases presented pains in the loins, frequent micturition, weakness, dyspnoea, vertigo, headache, feeble and rapid pulse, endocarditis, and pericarditis. The urine varied, in specific

gravity, between 1002 to 1008. In some cases the urine contained albumen. Some of the cases complained of cough. Six female patients presented manifestations of derangement of the function of the bladder. Fever was not invariably present. In several cases there was vomiting and purging. Four cases terminated fatally. A wide range of treatment was employed.

Treatment.—Laveran³¹ Feb. 19, 26 admits that, when the condition is not acute, a cure may be effected by institution of a tonic and reconstructive plan of treatment into which quinine does not enter. Of all tonic remedies arsenic remains by far the most potent in the dissipation of rebellious forms of malarial disease and of the malarial cachexia. The drug, however, must be administered *in* small doses. Doses large enough to occasion gastric derangement do harm. For acute malarial disease, however, quinine is indispensable. It is probable that the efficacy of quinine in paludal disease depends upon a specific destructive action upon the haematozoa. The hydrochlorate of quinine is the preferable salt, because of the large proportion of quinine it contains. On account of its great solubility the neutral hydrochlorate is to be preferred to the basic hydrochlorate. For hypodermatic injection, 5 grammes (1½ drachms) of the former may be dissolved in sufficient distilled water to make 10 cubic centimetres (15½ grains), so that each cubic centimetre of the solution contains 50 centigrammes (7½ grains) of the hydrochlorate. Should the neutral hydrochlorate not be available, 5 grammes (1½ drachms) of basic hydrochlorate of quinine may be added to 5 cubic centimetres (1½ drachms) of a solution of hydrochloric acid in distilled water of a specific gravity of 1045; sufficient distilled water is added to make 10 cubic centimetres (2½ drachms); the resulting solution is filtered. The injection causes pain, but does not cauterize. As a substitute, 1 gramme (15½ grains) of basic hydrochlorate of quinine may be mixed with 3 grammes (½ drachm) of alcohol and 6 grammes (96 minims) of water; and to the mixture sufficient hydrochloric acid is added to make a perfect solution. At ordinary temperatures a cubic centimetre of the solution contains a decigramme of the salt. Kobner has proposed to dissolve from ½ to 1 gramme (7½ to 15½ grains) of hydrochlorate of quinine in 2 grammes (40 minims) each of pure glycerin and distilled water. A solution of 1 gramme (15½ grains) of quinine sulphate in 10 grammes (2½ drachms) of distilled water and 50 centigrammes

(7½ grains) of tartaric acid may also be employed hypodermatically. Care should be taken that the solution is clear, containing neither crystals nor spores, and that the injection is made into the subcutaneous tissues.

Atkinson¹⁵ recommends a combination of tincture or of extract of eucalyptus and quinine, with a morning saline, frequently repeated. Duncan⁶ shows that, while arsenious acid exerts little or no prophylactic influence, quinine and cinchona do exert such an influence. Guttmann and Ehrlich⁸⁴ reported the successful employment of methylene-blue. Seven and one-half grains (0.5 grammes) were given six hours in advance of the time of the expected attack, and, subsequently, 1½ grains (0.097 grammes), or more, five times daily.

The nature of the continued fever of the Southern United States is still a matter of discussion. Barber¹¹⁷ and Howett⁸⁵ conclude that it is really enteric fever, while Shepard⁷⁶⁰ considers it a hybrid affection,—one element predominating in certain localities, another element in other localities. Mason⁸² states that in Arkansas there occurs a continued fever, known as "slow fever," which is most prevalent in autumn and winter, and which sets in with a chill followed by fever. Headache, nausea, and tympanites are also present. In treatment an initial dose of quinine may be given, to be followed by the administration of carbolic acid and solution of potassium arsenite. The continued administration of quinine appears to aggravate the symptoms and occasionally to cause rigors.

THE MALARIAL FEVERS.

(From the ANNUAL for 1893.)

Etiology.—Bacchelli, of Rome, ⁸⁰ states that in some cases of intense malarial fever it may not be possible to detect the presence of pathogenic micro-organisms during the first few days. Even when the organisms are found they may be present in numbers too small to warrant a belief in a causal relation between their number and the intensity of the febrile manifestations. On the other hand, amoebæ may be present in the blood in large numbers, and, if for any reason they have not reached the stage of spore-formation, may not of themselves give rise to febrile manifestations. The occurrence of a paroxysm may, with certainty, be predicted if micro-organisms be observed within the blood-corpuscles in process of division or spore-formation. With the onset of a new attack, neither the spore-forming nor the newly-formed organisms are to be found. In cases in which paroxysms are induced artificially, some, even if of severe type, present no forms of pathogenic micro-organisms within the blood-corpuscles at the onset of the fever. Death may result from indubitable malarial infection, without haematozoa having been found in the blood. The injurious effects resulting from malarial infection are to be ascribed (1) to the progressive destruction of the red blood-corpuscles by the activity of a parasite that thrives at the expense of the red cell,—a morphological blood-dyscrasia; (2) to a process more profoundly manifested, and by which the products of division and spore-formation are thrown into the blood-plasma,—a chemical blood-dyscrasia. Mannaberg, of Vienna, ⁸⁰ _{Aug. 4} relates that in cases of pernicious intermittent fever he has observed that the crescentic bodies undergo changes in form, becoming at times oval and at other times spherical; the latter possess flagella. These bodies are sometimes difficult to find, because present in small numbers. Amœboid bodies contained within the red blood-corpuscles become applied one to another, merge together, and become included within a common membrane, and then undergo segmentation. In this way there result unpigmented crescentic

bodies. Most of the crescentic bodies are structureless, but some have a structure, with the appearance of dividing into two, with two nuclei. In these the pigment is also usually arranged in two groups, either in the shape of a figure of eight, or in two masses, or in two rows. The conclusion is reached that the crescentic bodies are copulation forms of from two to four amoeboid bodies. Quinine causes decided changes in the parasites. As early as three hours after its administration the nuclei have disappeared and the plasma has become granular; after the ingestion of more quinine the body undergoes disintegration.

Arnaud²⁴³ _{Sept.} has reported the results of a study of the blood in 289 cases of various forms of paludism observed in the military hospital at Tunis during the year 1891. There were few cases prior to April. The largest numbers were observed during the months of June, July, August, and September. In the period from January 15th to March 20th no organisms were found in the 21 cases examined; in the period from March 23d to the end of August spherical bodies were most commonly found; while subsequently, spherical, crescentic, and flagellate bodies were found. Of the total number of cases, spherical bodies of various dimensions were found in 141; flagellate bodies in but 1; crescents in 11 (in 2 cases semi-lunar and spherical bodies were present in large numbers); in 23 cases melanæmic pigment alone was found. In 21 other cases small, motile, pigmented bodies, roughly resembling micrococci and provided with one or two flagellæ, were found. These were most frequently present in the months of August and September. It was perfectly evident that there was but one organism, which appeared in many different forms. One case showed successively the various forms and the two modes of regeneration—by fission and by sporulation.

Hehir²⁴⁹ _{Nov. 1, '91} gives an excellent description of the life-history of the haematozoön of malaria, based upon his own observations. He concludes that the spores of the organism belong to the infusoria, and that they are polymorphous. They may gain access to the blood through the respiratory apparatus, by being inhaled, or through the gastro-intestinal tract, being taken up with water. The spores, once having entered the blood-stream, rapidly infect the red blood-corpuscles either by direct entry or (what is much less probable) by a "spermatic influence." The intermediate stage of the devel-

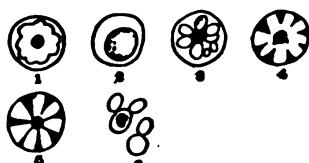
opment now begins, and culminates in the creation within the corpuscles of the spherical organisms, which gradually make their way from the corpuscles, leaving the transparent relics or shells of the red blood-cells behind. The spherical bodies may now develop into one or the other of the following: (a) small amœboid bodies, with excessively fine, actively moving processes; (b) bodies to which Hehir gives the name of *hæmatomonas maliæ stellataæ*; (c) small, free, flagellated organisms; (d) filaria-like organisms of two kinds,—(1) one of considerable length, sometimes reaching $\frac{1}{80}$ inch and extremely attenuated, the breadth, although tolerably uniform, varying from $\frac{1}{15000}$ to $\frac{1}{20000}$ inch; (2) another of comparatively great length and breadth, and not very dissimilar to the *filaria sanguinis hominis* of Lewis; (e) large, spherical, or irregularly-shaped flagellated organisms. Each of these five organisms is set free by the disintegration of its containing spherical cell; the limiting membrane or cell-wall gradually becomes more and more indistinct, the granular particles contained within it are seen to separate, and many of them assume the characters of spores. As the process of disintegration advances, the outline and general characteristics of that variety of the organism about to be developed become more and more distinct. Subsequently the fully-developed parasite either sets itself free by its own movements or by the disintegration of the original spherical cell. Now, the constituent spores, granules, and pigment-particles disperse, until at length nothing of the original spherical-cell organism remains. The newly-formed organism at this stage begins an independent existence, but its life is comparatively short, for it does not live longer than four days. In turn, it also undergoes degeneration, giving origin, as a rule, to the smaller varieties of the parasite, especially to the spores and the small, free, amœboid bodies, which are now ready to infect myriads of fresh red cells. With regard to the intra-corporeal development of the crescentic, pyriform, and *trichomonas-like*, and other bodies, the first appearance noted is a small thickening (or what looks like a ~~con-~~ densation of the hæmoglobin) within the cell, in one, two, or ~~more~~ places. These thickenings run together and form bodies having ~~one~~ one or other of the shapes mentioned. The size of this ~~body~~ increases until it approaches that of the containing red cell. ~~One~~ of two things now occurs: either the corpuscle itself gradually

dissolves away (or at least becomes invisible), setting the organism free, or the latter makes its way out of the corpuscle by its automatic activity. In either case the newly-developed organism begins an independent existence, and is seen to be moving about the field. At first it appears to be transparent and highly refractive, and to be unprovided with appendages of any kind. These latter, however, come into view in the form of one, two, or more filamentary, protoplasmic processes, which appear to be attached to the cell-wall. These bodies (crescentic, pyriform, etc.), likewise, in the later stages of their life free, are seen to become granular and contain spores, and eventually to disintegrate. That one series of infected corpuscles should give rise to spherical bodies, and another to crescentic, pyriform, or trichomonas-like bodies, may depend upon the fact that, in the original infection, two or more varieties have gained access to the blood, and each, in its development, produces a mature organism peculiar to the particular variety of spores. In tertian ague, it is argued, it takes forty-eight hours for a generation of *haematomonas malariae* to pass through its life-history. In quotidian ague the daily return of fever may be assumed to be caused by a double primary infection at intervals of twenty-four hours, so that two generations of parasites are developing simultaneously; or there may be some idiosyncrasy on the part of the patient that favors a more speedy maturation of the malarial organisms; or the nature of the pabulum upon which the parasite lives is favorable to the rapid growth of development, maturation, and disintegration of the latter. Double quartan ague might be accounted for in the same way, as well as other varieties of ague in which the interval between the paroxysms is less than forty-eight hours.

Dock, of Ann Arbor,⁴⁵¹ _{reb.} reports a case of quartan fever, with the blood-findings. The attack had existed untreated for two weeks. The paroxysm began with a chill, without pronounced rigor, and with pain in the back and limbs. Vomiting appeared early. With the onset of fever there was dry cough, with yawning, headache, and cyanosis. Sweating did not occur. The spleen and liver were slightly enlarged, and the skin and scleræ were of a muddy tint. At the first examination of the blood, on the second day after the chill, a few plasmodia of medium size were found. These did not differ in appearance from those of tertian fever, though the amœ-

boid movement was rather sluggish. A day later the organisms had become larger, almost filling the red blood-corpuses. Segmentation began before the temperature rose above 99° F. (37.22° C.), and was complete within an hour, or before the chill occurred. The plasmodia were at all times scanty; on the day after a chill none were found. The segmenting bodies are represented in the illustration. No flagellate bodies were found, and no pigmented leucocytes.

Morbid Anatomy.—Osler⁷⁶⁴ has reported two fatal cases of malarial intoxication. One occurred in a sailor, 34 years old, who, during a season of hot weather, while in Savannah for a week, had been in the habit of sleeping upon the grass. Vomiting and prostration were the most marked symptoms. The temperature was for a time elevated, but, declining, became subnormal. Examination of the blood disclosed the presence of large numbers



PARASITE OF QUARTAN AGUE.
(International Medical Magazine.)

of intra-corporeal organisms, some pigmented and some not; many leucocytes presented pigment-granules. The urine contained a small quantity of albumen and hyaline and granular tube-casts. Despite the fact that the patient was given $\frac{1}{2}$ -drachm (2 grammes) doses of

quinine every six hours (hypodermatically when vomiting became excessive), he died after six days, although the number of organisms in the blood diminished considerably. At the post-mortem examination the spleen was found enlarged and soft; the liver was large, firm, and slate-gray in color; the kidneys were large, the medullary rays pale, the vessels congested; in the stomach were several cicatrices; on the surface of the dura mater, far back on the right side, was a small haemorrhage; on the middle of the first frontal convolution on the right was a small area of pigmentation in the pia. Microscopically, yellow, irregular granules of pigment were found in the liver-cells; around the capillaries between the liver-cells there were black pigment-grains. In the spleen the pigment-granules were small and mostly free; a moderate number of cells contained red blood-corpuses. Some of the red blood-corpuses contained pigmented plasmodia. Yellowish-brown granules were found in the uriniferous tubules, and deep-black granules in the intertubular tissues and in the glom-

eruli. The second case occurred in a berry-picker, who had been exposed to the sun and presented symptoms of insolation. On the seventh day after coming under observation the man had a chill, followed by decided elevation of temperature. The blood was examined, but plasmodia were not found. The pulse became irregular and intermittent; Cheyne-Stokes breathing set in; vomiting occurred; there was slight diarrhoea. The man gradually sank and died. At the post-mortem examination the spleen was found enlarged, softened, and deeply pigmented. The liver was pigmented and myristicated. Both the blood and the spleen contained malarial organisms.

Incidence.—Maureau²¹² _{July 10} has called attention to the fact that for two centuries the Isle of Réunion had been free from malarial fever. In 1850–52 the disease appeared for the first time, and again from 1869 to 1873, since which time it has been endemic. On inquiry into the facts, it develops that the appearance of the disease coincided with periods of Indian immigration, and, bearing in mind the parasitic nature of the disease, it is argued that its introduction may reasonably be charged to importation. Based upon an experience of twelve years in the West Indies, Pierz, of Antigua,² _{Jan. 18} makes the statement that negroes suffer quite as much from malarial fevers as other races. The form which they usually manifest is the intermittent, together with pronounced enlargement of the spleen in chronic cases. Remittent fever, on the contrary, is rare among negroes. As a rule, small doses of quinine—2 or 3 grains (0.13 to 0.19 grammes) every three hours—are sufficient to check the intermittent fevers of negroes.

Clinical.—Valdes, of Tucuman,⁹²⁵ _{Jan.} makes three varieties of masked malaria: (1) simple masked malaria, characterized by neuralgia, with irregular remissions and exacerbations in the course of the twenty-four hours, without general febrile phenomena; (2) regular masked intermittent malaria, with a mild initial chill, followed by slight febrile reaction and sweating, and accompanied by neuralgia, recurring daily at the same hour; (3) irregular masked intermittent malaria, in which the manifestations just mentioned appear, but at irregular times. In all three varieties the predominant element is pain. The third is the most commonly observed; the second the most rarely. The latter is amenable to massive doses of quinine, given six or seven hours before the advent of the

attack. In the other two varieties fractional doses of quinine are preferable. Parke⁹ reports that he found quinine useful in warding off the infection of African malaria. Four grains (0.26 gramme) were given as a prophylactic twice a day, for a period of about ten days, to the members of an expedition that traversed a distance of three hundred and fifty miles through one of the most unhealthy regions of Africa, occupying a period of five weeks. It was observed that a wetting of the body, either in wading across streams or by rain; or exposure to a chilling breeze, during or soon after active perspiration; or direct and prolonged exposure to a very hot sun, if the head and spine were not sufficiently protected, was followed by an attack of remittent fever. Each attack was ushered in by a well-defined series of premonitory symptoms. The individual became flushed and talkative, and impatient of contradiction; the eyes were prominent, staring, and glistening; the movement of the limbs was less restrained, so that the dress soon presented signs of more or less disarrangement and the hair became disheveled. The temperature was rapidly running up *pari passu*, its ascent usually preceding other observable signs of illness. With the elevation of temperature the malaise increased, being usually, though not always, proportional to the degree of fever-heat. The muscular pains, especially in the lumbar region, were often quite severe; in the calves they often assumed an intolerable cramping character. Pain in the temporal regions was also an early and often a most distressing symptom, sometimes continuing for one or two days after the subsidence of the temperature. At the commencement of the attack the face always presented a sallow appearance, which was soon replaced by flushing. Often there was no initial shivering (*cold stage*). Respiration quickened with the increased frequency of cardiac action; the latter was strong, often violent. Gastro-intestinal derangement appeared simultaneously with the febrile and circulatory symptoms and progressed with them. Constipation was always marked; there was also flatulent distension of the abdomen, with borborygmi and eruptions; vomiting occurred early, and the retching was often very persistent. The ejection of a large quantity of biliary matter was followed by great relief. During the febrile period the tongue was covered by a whitish fur. Defervescence was usually accompanied by profuse diaphoresis (*sweating stage*), the absence of which was

an indication of recurrence. When the three classic stages of ague were present, the first stage was always the shortest, the second the longest. With the initial stage of the fever there was a determination of blood to the abdominal viscera, even when no definite rigor was evident. Coincidentally, the spleen was enlarged. The liver was sometimes tender. There was an increased excretion of urine of lowered specific gravity. In the severe cases the urine became bile-tinged toward the end of a paroxysm. In the early period of the attack the mental faculties were stimulated; ideas flowed more freely, and the individual became more talkative and argumentative. Unless cramps occurred, muscular activity was fairly well preserved, until, perhaps, recurring attacks had brought about weakness. As a rule, the prostrating effects of the fever were very manifest in those cases only in which the temperature failed to reach the normal, *i.e.*, was remittent. In the worst cases the remissions became less and less distinct and the powers of the system rapidly exhausted. The patient wasted and was slow in regaining flesh and strength.

Mackenzie, of London,² has reported a case of malarial intermittent fever, in a sailor 27 years old, in which, on different occasions, the thermometer recorded 113.8°, 112.8°, 112.6°, 110.8°, 109°, and 107.2° F. (45.4°, 44.88°, 44.77°, 43.77°, 42.77°, and 41.77° C.). Extraordinary care was taken to prevent manipulation or deception. On one or more occasions the temperature was taken simultaneously in both axillæ, and the readings were found to correspond. The rigors that occurred were severe, and a short, hot stage was followed by profuse sweating. Except on one occasion, the patient did not seem profoundly ill at the times when the high temperatures were recorded. The periods of hyperpyrexia were exceedingly brief, and this fact may account for their innocuousness. On one occasion pigment-granules were found in the blood. Hare, of King's Inn,² in commenting upon the case reported by Mackenzie, referred to a similar case in a woman, in which it was found that the patient harbored a tape-worm, upon the expulsion of which the symptoms disappeared.

Complications and Sequelæ.—Da Costa has¹⁰¹⁸ reported a case of malarial paralysis, in which the accuracy of the diagnosis was confirmed not only by the therapeutic test, but also by an examination of the blood. In addition to the palsy of the

extremities, interesting ocular lesions were found (Harlan, ²⁰⁷⁴ ANNUAL, 1891, vol. i, H-61). There were, besides, headache, impairment of memory, hallucinations, and maniacal delirium. Attention is called to the fact that there may be an intermittent paralysis that is not malarial, and that the manifestations of malarial paralysis are, in the majority of cases, far from being periodic. Three forms are distinguished: (1) general paralysis, or paraplegia, with irregular symptoms; (2) that in which periodicity is striking, which is more commonly hemiplegic; (3) the rarest, in which organic disease is produced by the malarial infection, and in which periodicity and variability are not prominent, the case pursuing much the course of ordinary paralysis when produced by its usual causes. The last form is usually due to a lesion, such as meningitis or haemorrhage, and manifests itself most commonly as a hemiplegia. Strictly speaking, it is not a malarial palsy, although malarial fever has brought it about. It is rather a palsy in the course of malarial disease. In the treatment of malarial palsies quinine must be given in large doses.

Hill, of West Roxbury, Mass., ⁹⁹ has reported the case of a boy, 18 years old, dull, morbid, and melancholic, who, at the time of the anticipated chill in the course of an attack of malarial fever, was seized with convulsions. The temperature rose to a considerable height, and the convulsions continued for several hours, notwithstanding the administration of chloroform, amyl nitrite, and nitro-glycerin. Quinine and bromides were also given, but the paroxysms recurred and terminated fatally. In a second case, in a boy 9 years old, numerous paroxysms of convulsions occurred in the course of a malarial attack. In a second attack of malarial fever the convulsions recurred and were repeated on alternate days for a number of days, finally ceasing and recovery ensuing. Subsequently, however, paroxysms would occasionally occur at night.

Combemale, ⁷⁸ has reported the case of a man, 42 years old, who, for a period of ten years, had been exposed to malarial infection, and presented motor, sensory, and trophic symptoms that pointed to the existence of a multiple neuritis, which resisted treatment with quinine, but yielded to electric treatment.

Rosenfeld ³⁴ describes the case of a girl, 3 years old, who, for several days toward evening, had attacks of chills and fever, and who, for a day, presented torticollis, with the head turned to the

right. The sterno-mastoid and the other muscles of the neck were sensitive to touch. The condition is believed to have been a result of malaria. Other persons in the same house likewise presented symptoms of malaria.

Bagot^{171, 2} _{Jan., Feb. 20} has reported three cases of malarial fever with ocular complications. The first case occurred in a mulatto boy, 15 years old, who had a severe attack of bilious remittent fever, with gastrointestinal symptoms and coma, lasting for two or three days. Immediately afterward his sight began to fail, and three months later he had soft cataract in both eyes. The second case was in a mulatto girl, 16 years old, who also had a grave attack of malarial fever lasting for three days, immediately following which vision began to fail; nine months later there was soft cataract in both eyes. The third case was in a little white girl, who had an attack of malarial fever, with delirium, convulsions, and loss of consciousness, lasting two days; then for a day there was complaint that vision was red; subsequently sight rapidly failed, and on the fifth day the child was entirely blind. An incomplete ophthalmoscopic examination disclosed the existence of retinal haemorrhage upon both sides, in the region of the macula. A year later both discs were atrophied; there was perception of light with the right eye; there was a slight degree of vision upon the left, with fairly good color-perception.

Krafft-Ebing^{113, 866} _{Nov. 1, June} has reported the case of a man, 29 years old, who, during a febrile attack two years after an attack of malarial fever, fell and received a slight injury over the right mastoid process. After this, attacks of unconsciousness, followed by stupor and delirium, occurred with progressively increasing frequency. Observation showed that the attacks were repeated on alternate days. There was usually an aura; then clonic convulsions, followed by stupor or delirium, or both. The temperature was usually elevated after the attacks. The attacks were controlled by the administration of 1 grammme (15 grains) of quinine bisulphate daily; subsequently the dose was reduced one-half. After dismissal, the attacks recurred, but they were soon dissipated by the administration of large doses of quinine and solution of potassium arsenite.

Hadj-Costa^{92, 9} _{Nov. 11, 191; Feb. 6} has recorded ten cases of pneumonia in individuals presenting a history of malarial infection. His obser-

vations lead him to believe that chronic impaludism predisposes to the development of a pneumonia characterized by a special train of symptoms. The invasion is usually insidious. The classical symptoms of a frank pneumonia, such as dyspnoea and pain in the side, are mild or wanting. In addition to the chronic congestion of the miasmatic affection, organic and functional derangements of the abdominal organs are common. Nervous and adynamic symptoms predominate. Resolution is often delayed. Suppuration may ensue. The mortality is high. Treatment by means of quinine and alcohol exercises a most favorable influence upon the course of the disease.

Bowie⁶ has reported the case of a tall, finely-built cavalry soldier, 30 years old, in Africa, who, having a morbid dread of African fever, determined to return to his home in Scotland. He had had several attacks of fever and was again seized. The man was exceedingly anxious about himself and suffered much from fear. The spleen was slightly enlarged. Following a chill and before the hot stage had set in, the man complained of severe pain, which he referred to his heart. He failed to sleep during the night. Retching was constant, a little greenish-yellow fluid being occasionally brought up. In addition to the pain referred to the heart, there was also pain in the loins, with an inability to pass urine, notwithstanding a desire to do so. The bowels had been moved twice, the stools consisting of a little dark-colored liquid. The expression was anxious, the face dirty-gray, the features somewhat pinched, the lips livid and pale, the eyes clear and the pupils dilated. The patient complained of intense thirst. There was pain in both hypochondria. The pulse could be felt, but not counted; the heart-sounds were faint and indistinct. The abdomen was tense above the umbilicus, but below it was soft and could be manipulated without pain. Pressure in the hypochondria elicited pain, in greater degree upon the left. By means of the catheter, an ounce of dark-yellow, slightly turbid urine was removed from the bladder; chemical tests disclosed the presence of albumen. Under stimulation the patient rallied slightly, but death finally occurred. When the abdomen was opened, a large amount of liquid and clotted blood was brought to view. This had evidently been poured out from the spleen, the capsule of which was found to be ruptured, although the organ was scarcely larger than normal.

Hodge²³⁵ has reported a case of adynamic remittent fever, in the course of which a copious petechial eruption appeared upon all parts of the body except the face. The bowels had been constipated. There was some cough, the tongue was red and irritable, and there was complaint of general pains. The patient was considerably prostrated and groaned a good deal. He presented no peculiar odor. Recovery followed treatment with mercurials and quinine.

Treatment.—Golgi, of Pavia, ⁶⁹ July 21, 1885; Aug. 4, 1885 has made an elaborate study of the action of quinine upon the parasites of malaria. He found that the employment of the drug, either by the mouth or subcutaneously, or injected into the veins, so that the remedy came in contact with the parasites at a time when the internal processes that lead to segmentation (spore formation) have already begun, did not inhibit the development of the parasites, and was thus incapable of preventing the appearance of the next febrile paroxysm. As the changes spoken of must take place earlier than they can be recognized, it cannot, with absolute certainty, be stated for how many hours before the anticipated attack the activity of the quinine is not manifested. Given three, four, five, and even from six to ten hours before the paroxysm the drug exerts no influence upon the colony of parasites approaching maturity. If quinine be given under the conditions already named, although it does not affect the parasites or does not prevent the succeeding paroxysm, it exerts a pronounced influence upon the new generation of parasites, which are destroyed if the dose of the drug be large enough. It is upon this action that is based the direction that quinine be given three, four, or five hours in advance of the paroxysm. It is not desirable to increase this interval, as otherwise, undergoing elimination, the quinine might not remain in sufficient quantity to destroy the new generation. It is not so well to give quinine after the paroxysm, as thus time may be given for the new generation of parasites to gain entrance into the red blood-corpuses. There can be no objection to giving quinine at this time, if the administration is repeated. If quinine be given so that it finds its way into the blood at a time when the parasites are in the stage of the small endocorpuscular amœbæ (in quartan fever on the first day of the apyrexia), it is capable of interfering with the development of the parasites, and it may at times attenuate or retard the next par-

oxysm; but it cannot be depended upon to neutralize the infection. The interference with the development of the organisms bears a certain relation to the size of the dose. If full doses are given repeatedly during the apyretic stage, not only may the next paroxysm be aborted, but the infection may also be neutralized. The phase of development in which the endocorpicular parasites are most readily affected by quinine, and in which the probability of aborting the next paroxysm is greatest, is that in which but a small area of the body of the parasite remains (in quartan fever toward the end of the second day of the apyrexia); the neutralization of the infection is, however, less certain and safety from relapse slighter. The practical outcome of these observations is, that quinine should be given in a full dose three, four, or five hours in anticipation of a paroxysm and for several successive days. In the fevers of irregular type quinine should be given uninterruptedly for weeks.

Martin, of Green Grove, Miss.,¹² makes a warm plea for the non-employment of quinine in cases of malarial haematuria. He considers the damage done, and the malarial parasite beyond the reach of medication, when the haemorrhage has taken place. While ordinarily, when quinine is given, malarial haematuria is considered a grave disease, of which from 20 to 50 per cent. of the victims die, and relapses are common and convalescence is slow in those that recover, it is contended that, if quinine be not employed in treatment, the prognosis is by no means so discouraging, relapses are uncommon, and convalescence is rapid. It is recommended that turpentine be given, that the bowels be kept open, preferably with salines, that the nutrition be scrupulously maintained, that iron be given, and, when convalescence has set in, that arsenic be administered.

Buro^{622 169} No. 51; Apr. divides antipyretic drugs into three groups, according to their action: (1) those that act in the apyretic interval, e.g., quinine; (2) those that act during the febrile period, e.g., sodium salicylate; and (3) those that act at all times, e.g., eucalyptus. Particularly in private practice is the use of quinine attended with the objection that the facts in a given case must be obtained from the patient; that the apyretic intervals are sometimes so short that the action of the drug appears too late; and that, when inflammatory and catarrhal conditions are present in

addition to intermittent fever, quinine usually fails. Eucalyptus, on the contrary, acts favorably under these conditions. The most certain and the best results are most speedily obtained if the drug is injected beneath the skin. It is well to mix the ethereal oil with a fatty oil, and to give doses of from 0.1 to 0.3 grammes ($1\frac{1}{2}$ to $4\frac{1}{2}$ grains). In some cases relapses occurred that yielded only to quinine. Sasse ⁵⁸³ _{Jan. 30, Apr. 22} ⁴¹ recommends the employment of cinchonine when quinine cannot for any reason be taken. Cinchonine has a further advantage over quinine in that it is the cheaper. It is given in corresponding doses. The drug may be administered in simple syrup, but preferably not in a single dose, as it may cause vomiting. The tinnitus aurium and the oppression of the chest observed after the taking of quinine are not observed after the administration of cinchonine. On the other hand, the use of cinchonine is followed by dryness of the nose, mouth, and throat, with paresis of the accommodation, without alteration in the size of the pupils. After an extensive experience in Syria, Gemayel ⁶⁷ _{Dec. 30, '91} strongly indorses the utility of cinchonidine sulphate. He found the drug quite as certain, as rapid, and as efficacious as quinine, and particularly valuable in cases in which quinine was for any reason contra-indicated or could not be taken. As a rule, 1.5 grammes (23 grains) were administered on the first, the second, the fourth, and the sixth days of the first week and on one or two days of the second week. It was usually administered at bed-time. In chronic malarial infection arsenic, iron, and hydrotherapy proved useful therapeutic adjuvants.

Mya ³⁷⁶ _{Dec. 31, '91, Mar. 19} ² has employed methylene blue in nine cases of malarial fever. In some of the cases it had a decided effect upon the course of the fever, but in the majority the effect was slight or but transient. Methylene blue is objectionable on account of the severe gastric pain, pyrosis, and strangury to which it gives rise; it also displays a tendency to diminish the quantity of urine excreted.

Thayer ⁷⁶⁴ _{Feb.} reports five cases and refers to two others, in all of which haematozoa were found in the blood, and in which successful therapeutic results were obtained by the administration of methylene blue, in doses of 0.1 or 0.2 grammes ($1\frac{1}{2}$ to 3 grains) five times daily. It is admitted that the number of cases is too small to draw definite conclusions from the results. In all of the cases

in which methylene blue was given alone, strangury developed in the first three days, which was, however, at once relieved by the administration of from 10 to 20 grains (0.65 to 1.3 grammes) of powdered nutmeg. In the cases in which nutmeg was given from the outset no unpleasant symptoms appeared. In all of the cases the urine was of a deep-blue color; in none, however, did it contain albumen. The faeces, though untinged when passed, became blue on exposure to the air. The sweat and the saliva, however, did not appear to be colored. The same author¹⁶⁴ _{Aug. 18} reports 7 additional cases in the treatment of which he employed methylene blue. Of these, 2 were cured; in 2 more a definite cure may have been obtained; in 2 others immediate temporary benefit was noted, followed, however, by an increase in the number of organisms and a return of fever, but finally yielding to quinine; in the seventh case the symptoms remained in abeyance for twenty-two days, although the organisms never entirely disappeared from the blood. The conclusion is reached that, while methylene blue exerts a definite influence in the treatment of malarial fever, by a destructive action upon the specific organism, it seems to possess no advantage over quinine that would warrant its further use. Boinet and Thintignan¹⁴ _{June 5} also report the successful employment of methylene blue in the treatment of malarial fevers. They administered from 0.50 to 1 gramme ($7\frac{3}{4}$ to $15\frac{1}{2}$ grains) daily, in pills, for a period of two weeks. In the acute stage of grave cases, 1.5 or 2 grammes (23 to 31 grains) were given at once, and repeated if necessary. No unpleasant complications were observed. The urine was increased in amount, and remained discolored for five days after the withdrawal of the drug.

Huddleston, of New York,⁵⁹ _{Aug. 18} describes the cases of three sisters, 10, 7, and 5 years old, respectively, with chills, fever, and sweats on alternate days, plasmodia being found in the blood of the eldest. Each was given methylene blue (0.1 gramme— $1\frac{1}{2}$ grains), the eldest every three, the second every four, and the third every five hours during the waking period, for four days. The urine was colored blue, but was passed without difficulty. The blood was examined after four days, but no parasites were found; neither did the children have a recurrence of the symptoms.

Mühll, of Basle,²¹⁴ _{Sept. 1} has reported the case of a man, 38 years old, who presented symptoms of quotidian intermittent fever, with

plasmodia in the blood, the febrile stage occurring between 8 and 9 o'clock in the morning. Five capsules, each containing 0.1 gramm (1½ grains) of methylene blue, were given toward evening, without apparent result. Following the second five, the temperature subsided to normal, not again to rise. After three weeks, the spleen was not enlarged, although plasmodia were still present in the blood. The patient had gained in weight; the number of red blood-corpuscles and the amount of haemoglobin had likewise increased. There was no strangury or other discomfort. The urine was blue four hours after the taking of the first dose. In all, 3 grammes (46 grains) of methylene blue were taken.

Laveran ³_{Feb. 3} has made a study of the blood of pigeons treated with injections of methylene blue, and failed to find any changes in the haematozoa, which are closely allied to those found in man. The same negative results were obtained in two cases of malaria treated in a similar manner.

Burg ⁶²²_{No. 30; Aug. 19} ¹⁵² has employed the alkaline nitrates in the treatment of the malarial fevers. The potassium and sodium salts act much alike; the former is, however, the less toxic and the more soluble. In adults an ordinary dose is from 1 to 1.5 grammes (15½ to 23½ grains), which is best administered in the interval between attacks or at the onset of an attack. The results of the treatment were variable; it succeeded in some cases and failed in others. The nitrates possess the advantages of ease of administration, of absence of disagreeable taste, and of not deranging the digestion, or occasioning symptoms referable to the nervous system.

From personal experience, as well as from the testimony of others, Déclat ¹⁷⁵_{June} recommends the employment of carbolic acid in the treatment of the various forms of malarial fever. In the hot stage he makes two injections beneath the skin of 100 drops of a 2.5-per-cent. solution of pure carbolic acid in aseptic hydrated glycerin. If the paroxysm is repeated, 100 drops of a corresponding solution of ammonium phenate are injected; and the injection may be repeated for several days after the last attack. For several days after the disappearance of the fever 2 or 3 teaspoonfuls of a 1.5-per-cent. syrup of carbolic acid may be given daily. In rebellious cases recourse may be had to injections of a 5-per-cent. solution of quinine phenate in sterilized oil.

Ranson ¹⁹⁵_{Dec. 16; Feb. 10; Apr. 15} ⁹⁰⁶₈₀ reports the successful employment of an

infusion of kinkélibah, or *Combretum raimbultia*, an arborescent plant that grows in Western Africa, in the treatment of severe cases of remittent fever in the Soudan. The leaves of the plant can be dried and be preserved for years without losing their active properties. They are reduced to powder, and an infusion of 1 drachm (4 grammes) to $\frac{1}{2}$ pint ($\frac{1}{2}$ litre) of water is made. At the onset of the attack, particularly if there is hæmaturia, a wine-glassful may be given every ten minutes; vomiting results, and favorable symptoms follow the remission that takes place. Subsequently quinine is given.

Albertoni⁵⁸⁹ has tried phenocoll in 34 cases of malarial fever. Of these, 24 were permanently cured; in 5 the results were doubtful; in the remaining 5 no good was accomplished. In some of the successful cases quinine had been employed without avail. Phenocoll was given in doses of 1 gramme (15½ grains), in powder or in solution, from five to seven hours before the expected paroxysm, and was continued for some time to prevent relapses. The use of the drug was attended with no unpleasant effects; its taste was readily masked by sugar.

THE MALARIAL FEVERS.

(From the ANNUAL for 1894.)

The biology of the malarial organism is receiving considerable and deserved attention. The various types of paludal disease are believed to depend upon differences in the mode of development and reproduction of the parasite, the paroxysm coinciding with the setting free of a new generation. The deleterious effects due to the presence of the organism are primarily attributable (1) to a destructive action upon the red blood-corpuses, by which the protoplasm of the cells is taken up by the intra-corporeal bodies and the haemoglobin converted into melanin, and (2) to a toxic influence exercised by the products of the vital activity of the parasites. Further, secondary changes in various viscera may result from the anaemia induced, from the action of the toxins generated, and from morbid conditions arising in the circulatory system, such as thrombosis or embolism and haemorrhage.

Etiology.—Marchiafava and Bignami⁶⁹ conclude that malaria is an infectious disease caused by an haematozoön that does not belong to the order of schizomycetes, but to the protozoa (Laveran). The haematozoa appear as amoebæ, which develop within and at the expense of the red corpuscles, converting the haemoglobin into melanin or rapidly causing a toxic necrosis, anaemia thus resulting. The amoebæ complete within the red corpuscles a cycle of existence, beginning with the motile unpigmented forms (which become pigmented in the process of development), and terminating with the segmentation forms, representing the multiplication of the organisms. As soon as the spores resulting from the segmentation are set free they are replaced by new amoebæ, which, in their turn, invade other red corpuscles. This cycle of life is repeated regularly in harmony with the periodic recurrence of the paroxysms, segmentation being coincident with the beginning of a paroxysm (Golgi). During this cycle of existence the amoebæ probably give rise to the formation of toxic substances, the actual demonstration of the existence of which is, however, yet wanting. In the act of reproduction the amoebæ probably produce a pyrogenic toxin; during their intra-corporeal development, in the course of fevers of severe grade, they produce toxic substances possessing the property of causing necro-

sis of the red corpuscles, of separating the haemoglobin from the protoplasm, and of inducing changes in internal organs,—e.g., the kidneys in some pernicious forms. The morphological and biological peculiarities of the parasites differ among the various type or species of fever; so that the existence of several varieties of parasites seems reasonable. The difference in the pathogenic peculiarities of the parasites justifies the assumption of various types or species of fever. The most recent investigations lead to the acceptance of the following varieties: The amœba of quartan fever (Golgi); the amœba of tertian fever (Golgi); the amœba of summer-autumn tertian fever; and the amœba of quotidian fever. The pernicious types of fever are caused only by the last two, and the character of the attack is explicable by the biology of the parasites. The practical outcome of this knowledge is that it thus becomes possible to differentiate at once those cases that may prove pernicious from those that never do. The amœbæ of malaria, which develop and multiply in the blood, occasion not only acute changes, alterations in the blood, leading to hypoglobulina, but also in the vascular system of all, and of the parenchyma of some, of the viscera (spleen, liver, medulla of bone). These anatomico-pathological changes are but transitory in some organs, and largely explain the symptoms dependent upon the acute infection. In other organs (spleen, liver, medulla of bone), however, the changes are of a more permanent character, and suffice to explain the chronic anaemia, as well as the symptoms of chronic infection and the cachexia.

Mannaberg, of Vienna,²⁰²³ v.11, p. 47, ~~1877~~ divides the micro-organisms of malaria into two groups: (1) parasites that undergo direct sporulation without syzygies, and (2) parasites that undergo direct sporulation with syzygies. In the first group are placed the organisms connected with the quartan and tertian varieties of the disease; in the second the pigmented and unpigmented organisms found in the blood of patients suffering from quotidian ague, and also those described as occurring in the malignant forms of tertian ague. It was demonstrated that the younger forms of all of the organisms are not found within the blood-corpuscles, but outside. The semilunar bodies are believed to be formed by the coalition of from two to four amœboid bodies. The effect of the administration of quinine is to destroy and render the organisms inert.

Bacchelli, of Rome, ³⁴ succeeded in two cases in transmitting malaria by means of the blood of malarial patients, tertian fever developing in the person inoculated with the blood from the patient with tertian fever, and quartan in the person inoculated with the blood of the patient with quartan fever.

Allen J. Smith, of Galveston, Texas, ⁴⁵¹ records a case of malarial fever in which, during the first few days of observation, the crescentic forms of the haematozoön and the large spherical and ovoid forms appeared in regular alternation.

Bartley, of Brooklyn, ¹⁵⁷ has succeeded in demonstrating the presence of malarial organisms in the water obtained from the source of common supply for the city of Brooklyn.

Histology.—In an histological study of the viscera in a fatal case of pernicious malarial fever, Stieda ⁸⁵⁴ found the trabecula of the liver stained brown, with accumulations of round-cells between the acini. The vessels were distended with blood, the large number of leucocytes present being a striking feature. The hepatic cells contained a good deal of shining, brownish pigment, but were in nowise degenerated. The same kind of pigment was present in smaller amount in the connective tissue of the liver and in the vessels. All of the granules yielded the iron reaction to potassium ferrocyanide and hydrochloric acid. The capillaries and larger vessels contained free, blackish granules that did not yield the iron reaction. In the splenic pulp an increase in the number of colorless blood-cells was found. A good deal of pigment yielding the iron reaction was present, partly free and partly contained in the leucocytes. The vessels were distended with blood and contained many leucocytes and considerable pigment; a second pigment was found that did not respond to the tests for iron. The parenchymatous structure of the pancreas was normal. Isolated areas of interstitial inflammation were visible. In the vessels were a small number of granules containing iron. The cortical structure of the kidney presented isolated interstitial accumulations of round-cells. The epithelium of the convoluted tubules was necrotic in places. These tubules, as well as the epithelium and the vessels, contained finely-granular pigment, yielding the haemosiderin reaction. The straight tubules and the glomeruli did not yield this reaction. The vessels and glomeruli contained blackish-brown granules in small number that did not

respond to tests for iron. The capsules of the glomeruli became stained a deep blue on treatment with potassium ferrocyanide and hydrochloric acid.

Symptomatology.—Négel²³ reports a peculiar type of remittent malarial fever observed in Roumania, for which he proposes the designation "pseudo-continuous." The attack sets in with headache, vertigo, vague general pains, and pain in the loins. Perhaps an attack of intermittent fever has preceded the onset. The temperature is elevated from the beginning, and on the second day may reach 39.5° or 40° C. (103° or 104° F.), with remissions of from 0.5° to 0.8° C. (0.9° to 1.44° F.). The appetite is lost, and there may be constipation or diarrhoea. Vomiting occurs, while there is little abdominal distension and only exceptionally pain in the right iliac fossa. The spleen is enlarged and painful on pressure, and the liver is also increased in size. The tongue is coated, sometimes with a yellowish-black fur. It soon becomes dry and red at the margins and tip; in rare cases it becomes dry and hard and the gums covered with sordes. The physical signs of acute bronchitis are present, while pneumonia is exceptional. Sometimes there is epistaxis in the first two or three days. In isolated cases rose-spots are present. In cases that begin as intermittent fever there is sometimes profuse sweating and sometimes sudamina. There is early delirium and agitation, aggravated toward night. The facies is that of the typhoid condition. The pulse is strong and full, without dicrotism. On the seventh or eighth day of the disease convulsions may take place, or there may be tremor of the tongue and of the upper extremities and subsultus tendinum. The attack ordinarily comes to an end between the seventh and the fifteenth day. Convalescence is often accompanied by pyrexia of intermittent character, which disappears either spontaneously or on the withdrawal of quinine, or even by change of diet. In cases that recover, strength is rapidly regained; in those that terminate fatally, the adynamia increases, the delirium persists, the tongue becomes dry and fissured, the abdomen distended, the bronchitis generalized, the pulse frequent, the remissions less pronounced; death may be preceded by coma, attended with profuse perspiration. Post-mortem the lesions of chronic malarial poisoning are found. The prognosis is ordinarily favorable. The treatment is that common to grave forms of malarial fever. Scott, of

Shire Highlands, British Central Africa, ³⁶ describes a malignant type of malarial fever encountered in Central Africa, to which the name of "black" fever is popularly given. It generally occurs in those who have been in the country for a considerable length of time or have been more or less exposed to malarial influences, or in those whose constitution has been undermined by exposure, excessive work of a pioneer kind, or excesses of other kinds. It would appear that there is no such thing as acclimatization to African fever; on the contrary, the longer one has been in the country, the more liable he is to a severe attack. The most conspicuous symptoms of malignant African fever, in addition to the classic manifestations of malarial disease, are: haemoglobinuria and albuminuria, with suppression of urine and uræmia; icterus, nausea, vomiting, and hiccuph. Death is the common issue, though the disease is not always fatal, recovery taking place in perhaps 40 per cent. of cases. Treatment is most unsatisfactory, neither quinine nor arsenic proving of much avail. The most important therapeutic measure is the administration of quinine as a prophylactic. In some cases surgical complications appear, such as the formation of multiple, painful, superficial, smallish ulcers upon the hands, fingers, or legs, in consequence of a mosquito-bite or other equally unimportant traumatism. Guyot ¹⁴ has reported a case, presenting incoercible vomiting, which refused to yield to all ordinary measures, but which ceased almost instantaneously after an injection of quinine. The patient had lived at Panama, and, beyond the vomiting, presented no manifestation of malaria, though his spleen was slightly enlarged.

Miner, of Combination, Mont., ⁵⁹ has reported a case of typical quotidian malarial intermittent fever observed at an elevation of more than 6000 feet above the level of the sea, and which responded to treatment with quinine. Dubujadoux ²¹³ points out that peptonuria is a constant manifestation of malarial intermittent fever, as it is of other febrile conditions, appearing with the onset of the paroxysm and often increasing to the end of the attack. He found 95-per-cent. alcohol the best reagent for determining the presence of peptone, first removing the albumen. Ascoli, of Rome, ³⁴ has found the amount of peptone in the urine greater after a malarial paroxysm than during its occurrence; the excess persisting in progressively diminishing degree for twenty-four hours

after the attack. Quinine augmented the excretion of peptone. The peptonuria was not proportional to the intensity of the fever, but to the severity of the attack, and was particularly pronounced in cases presenting the type of summer infection. The condition is ascribed to the disintegration of the blood-corpuscles during the paroxysm.

Pensuti, of Rome, ³⁴ has found that in all varieties of malaria the toxicity of the urine was increased from the beginning to the end of the attack, but not with any regularity of progression. The more toxic the urine, the more abundant the phosphates present and the deeper the color. The excretion of potassium rose and fell with the toxicity, though not constantly; so that the latter is not to be ascribed to the presence of potassium.

Rempicci, of Rome, ³⁴ has observed that the amount of sodium in the urine increases after mild attacks of malaria, while the amount of potassium increases after the graver attacks; although the elimination of potassium and sodium appears to bear no relation to the febrile paroxysms. The amount of potassium is more nearly proportional to the amount of urine than is the amount of sodium.

Complications and Sequelæ.—Alfoldi, ⁶²² has reported an epidemic of malarial fever, in the course of which he saw 46 cases. Of this number 5 were complicated by endocarditis. Of these 5 cases, 2 were of quartan type and 1 of tertian type; 2 came under observation in the second paroxysm; the others had had several attacks, though none more than five. The diagnosis was based upon an increase in the area of cardiac percussion dullness, upon a systolic murmur at the apex, and upon the accentuation of the pulmonary second sound. The febrile symptoms disappeared upon the administration of quinine, while those referable to the heart persisted. Neither of the patients was specially anæmic, and not one of them was aware of the previous existence of a valvular lesion.

Ferreira, of Rio Janeiro, ¹¹⁸ makes the statement that the renal complications of impaludism are much more common than is ordinarily understood, and that albuminuria in particular may often be found in children. This is the case not only with febrile forms of malaria, but also with apyretic and latent forms. As a result of careful observations upon the relative frequency of the various renal complications attending impaludism, it was found that albu-

minuria was the most common, simple polyuria next in frequency, and glycosuria but exceptional. Not rarely the albuminuria is associated with oedema, thus closely simulating nephritis. In some cases nephritis actually develops in the course of time; the albuminuria fluctuating irregularly in degree in the apyretic cases, increasing with the exacerbations, and subsiding with the remissions in the febrile cases. The symptoms can be made to disappear by energetic treatment with quinine, preceded by a mercurial.

English, of Millburn, N. J.,⁵⁹ _{Mar. 11} contends that malarial poisoning may cause any morbid condition that can be induced by acute or chronic, active or passive congestion of internal organs. Browning, of Brooklyn,¹⁵⁷ _{Jan.} has reported two cases of neuritis of malarial origin, presenting symptoms simulating those of brain-tumor.

Treatment.—In a recent work Tommasi-Crudeli²⁰⁴⁶ _{1882; Dec. 10, 1892} ⁶ points out that the poison of malaria is inherent in the soil; that it depends greatly on the influence of season, temperature, and rainfall; that it is excited to fresh activity by all measures involving the disturbance of earth long left quiescent; and that its ravages have been much reduced by drainage, by the conversion of naked soil into meadow-land, and by the erection of houses and laying down of paved streets. The traditional precautionary measures long adopted in malarious countries have had two ends in view—viz., to reduce, as much as possible, the quantity of the malarial ferment that enters into the system through the air breathed, and to prevent its lengthened abode in the system. The first point is sought to be achieved by avoiding agricultural operations during those hours at which the malarious influence is most potent—viz., about sunrise and sunset. Another point of the greatest importance is to avoid breathing the air in close contact with the soil, as the malarious poison rises only a short distance in a vertical direction. This end has been attained by erecting platforms, four or five metres high, upon which the people may sleep in the open air with comparative impunity. Another mode of eluding the malaria-laden air, in close contact with the ground, is to construct the dwellings in such a way that when the door is shut the internal air is renewed only by the strata of the local atmosphere that are near the roofs of the houses. This is managed, in some localities, by having the only opening in the outer walls at the door, and all

the windows open on an inner yard at a higher level than the ground-floor of the house. It is advisable also to keep the windows closed in the morning and during the early hours of the evening, especially if any excavation should be going on in the neighborhood. Flowers should be entirely excluded from houses when malaria is rife, or the utmost vigilance should be taken to secure thorough ventilation.

Williams,⁹⁹ reports 18 cases of malarial fever (12 tertian, 5 quotidian, and 1 irregular) treated in the Boston City Hospital by the intermittent administration of quinine, the temperature and not the chill being taken as a guide. Twenty grains (1.3 grammes) of quinine sulphate were given when the temperature began to fall. On leaving the hospital the patients were given quinine, to be taken on the seventh, fifteenth, and twenty-second days. It was not necessary to give quinine on the second day, as there was rarely any chill after the first dose. The intermittent method of administering quinine lessens the risk of the cinchonism that is likely to follow the administration of continuous doses; further, convalescence sets in more rapidly and a smaller amount of quinine is required. In severe forms of malarial fever one should not wait for the intermission or remission. If the stomach be intolerant, high rectal injections may be practiced; if there be urgency, quinine may be given subcutaneously, or even by intravenous injection. Laborde and Grimaux^{3, 151} Feb., Mar. recommend the employment of a new salt of quinine—the chlorosulphate—in the treatment of malarial fevers. It is said to possess the same action as the ordinary sulphate of quinine, but has the advantage of being soluble in its own weight of water; so that it should prove valuable for hypodermatic injection. Given in this way, it occasions less pain than the sulphate or hydrochlorate. The dose employed correspond with those of the other salts of quinine.

Francez, of Carenco, La.,⁷⁶⁰ Oct., 1892 agrees that in the treatment of malarial remittent fever the indication is to administer quinine, and at once, in full doses, at short intervals, until physiological effects are produced. When cinchonism is induced, the intervals should be lengthened, without, however, discontinuing the use of the drug. Various other agents may be employed in conjunction with quinine to meet special indications. Antimony, in 1-grain (0.066 gramme) doses every two or three hours, is useful when the face is

highly congested and there is violent headache. Of other adjuvants, the least dangerous and the most useful are general warm baths. Local ablutions of the entire body with water and some alcoholic render good service; or the patient may be plunged into a cold bath, to be followed by a warm bath, after which tea or coffee, together with Jamaica rum, brandy or cognac, or whisky, is to be given. The salts of opium and pieces of ice kept in the mouth are recommended to control vomiting, but a mixture of chloroform and cherry-laurel water has also proved satisfactory. Sinapisms to the epigastrium are useful. To diminish the intensity and shorten the duration of the fever, sulphur in doses of 15 grains (1 grammee) four times a day for an adult is recommended. Cases of adynamic type are better treated by means of a combination of extract of cinchona and rum, whisky, or cognac. In syncopal or comatose cases, tincture of nux vomica is added. As a prophylactic measure, the drinking-water in malarial localities should be boiled.

Villard ¹⁴ _{Mar. 29} has treated twenty cases of well-defined intermittent fever of diverse type (quotidian, tertian, and irregular) with cinchonidine sulphate, in doses varying from 1 to 1.5 grammes (15 to 23 grains) daily for adults. Most commonly the attack was brought to an end in the course of the first two days; in several cases, however, it was necessary to continue the treatment for three or four days. After the acute attack had been controlled one dose of a salt of cinchonidine was administered every seventh day for two or three weeks. Cinchonidine is regarded as almost as efficacious as quinine in intermittent fever; besides, it exerts a salutary influence upon the anaemia and the visceral congestions; while the physiological disturbances that sometimes follow the administration of quinine are less common and less profound. Having demonstrated (see ANNUAL for 1892) that methylene blue is capable of curing malarial fever, Guttmann, of Berlin, ³⁴ _{Dec. 20, 92} ascertained further that the remedy prevents recurrence, and also that it is efficacious in the pernicious forms. To prevent recurrence, the drug must be given for a period of at least four weeks. It exercises a destructive influence upon the malarial parasites, which disappear, at the latest, in the course of a week, without undergoing morphological change. When methylene blue is to be given for a long time it is recommended that in the first week 0.5 grammee (7.5 grains) be given

daily in doses of 0.1 grammie (1.5 grains) in capsule ; and thereafter 0.3 grammie (4.5 grains) daily in three equal doses for three weeks.

Kasem-Beck, of Kasan,⁸¹⁹ used methylene blue in 30 cases in which quinine and its salts disagreed, or in which these and other drugs, including phenacetin, antipyrin, phenocoll hydrochloride, ammonium chloride, tincture of helianthus, eucalyptus globulus, and arsenic had failed. The diagnosis was based on the physical examination, the blood being studied in but one instance, in which malarial parasites were present ; the cases were, however, in other respects typical. The patients varied in age from $2\frac{1}{2}$ to 40 years. Three suffered from masked intermittent fever, in one manifested by trigeminal neuralgia, in another by headache, and in the third by pains in the eyes for five years. It was in the last case that plasmodia were found in the blood. The remaining cases presented intermittent fever of varying kind, mostly, however, of tertian and quartan type. The duration varied from three weeks to a year, but was mostly from three to six months. The drug was given four or five times a day, at intervals of an hour, in capsules, in doses of 0.1 grammie ($1\frac{3}{4}$ grains), with 0.17 grammie (2.5 grains) of powdered nutmeg. The paroxysms soon ceased as a rule, and in only 1 case did recurrence take place, for the dissipation of which the official solution of potassium arsenite in ascending doses, became necessary. In 5 cases vomiting followed the ingestion of the first one or two doses. In most cases there was increased frequency of micturition, unattended, however, with pain. In some cases, in which the nutmeg was omitted, and in some in which full doses (0.30 grammie — 4.5 grains) were given, strangury occurred ; haematuria appeared in 1 case, but ceased after the withdrawal of the remedy.

Porenski and Blatteis, of Cracow,¹¹⁶ employed methylene blue in thirty-five cases of intense malarial fever, and conclude that the drug exercises an influence upon the plasmodia, as these were found to disappear and the paroxysms not to recur. The remedy was administered internally, or injected subcutaneously. The injections were given twice daily. 1 grammie (15 grains) of from a 1-per-cent. to a 5-per-cent. solution of methylene blue being used on each occasion. They were unattended with local pain or infiltration. The paroxysms did not recur after from three to five injections had been given. By the mouth capsules containing 0.4 or 0.5 grammie

(6 to 7.5 grains) were given twice or thrice daily. Unpleasant symptoms, such as headache, anorexia, and vomiting, were in some cases observed to occur after internal administration. Methylene blue is believed to be as useful as quinine in the treatment of malarial fevers, although in some instances it may prove ineffectual; as its use is, however, attended with certain unpleasant effects, it should be reserved for cases in which quinine fails. Kétli, of Budapest, ¹¹³⁰_{B.S.H.1}; ⁵⁷_{July 22} unsuccessfully employed the drug in five cases, in hourly doses of 0.1 gramm (1.5 grains) five or six times, as many hours in anticipation of the paroxysm. While it appeared to control the paroxysm, it did not prevent recurrence; so that ultimately quinine had to be substituted. Its use was also attended with irritability of the gastro-intestinal and genito-urinary tracts.

Neumann, of Budapest, ⁶²²_{No.1; June 6} ⁴¹ has used methylene blue in 3 cases of malarial fever. In 2 recovery ensued; in 1, improvement. Not only were the paroxysms controlled, but the size of the spleen was also reduced. The medicament was given in doses of 0.1 gramm (1.5 grains) five times daily, at regular intervals. Dabrowski ⁵⁸⁶_{No.11; May 15} ⁶⁷ confirms the favorable results obtained by other observers with methylene blue. Six cases were thus treated. Each received 0.50 gramm (7½ grains) daily, or 0.125 gramm (2 grains) at a dose. In five a cure resulted in the course of a few days, the fever subsiding, the spleen returning to its usual size, and the plasmodia disappearing from the blood. It is not believed that methylene blue acts directly upon the organisms, but rather that it renders the blood unsuited to their presence. No bad effects were observed. In one case nausea and vomiting appeared, but ceased on the withdrawal of the drug. In all of the cases the urine became of a greenish-blue color.

Ferreira, of Rio Janeiro, ⁶⁷_{June 15} treated upward of forty cases in children, with methylene blue, with entirely satisfactory results. The dose employed varied from 0.25 to 0.50 gramm (4 to 7½ grains), in the course of twenty-four hours, according to the age of the patient and the severity of the attack. The drug was of especial value in protracted and obstinate cases that resisted treatment by other means, and in cases of intermittent and remittent not sufficiently severe to be of immediate danger to life. In pernicious cases it would be judicious to join the subcutaneous

injection of quinine bihydrochlorate. The drug was readily taken and well borne, even by the youngest of infants, occasioning no unpleasant manifestations. In this respect it has a distinct advantage over quinine. The belief is expressed that the medicament exercises its curative action upon the malarial organisms, upon the infective process, as manifested by the disappearance of the characteristic symptoms, particularly the enlargement of liver and spleen. The drug appears to have mild antithermic properties. Its administration should be continued for several days after the subsidence of the fever and the disappearance of the other symptoms. It may be given in solution in syrup of orange-peel and syrup of canella. To larger children it may be administered in tablet, cachet, or capsule.

Moncorvo, of Rio Janeiro,¹⁴ tried helianthus annuus and methylene blue in the treatment of malarial fever in children. Sixty-one children were treated with helianthus, in the form either of an alcoholic tincture or of an alcoholic extract. Of the former, from 1 to 10 grammes ($\frac{1}{2}$ to $2\frac{1}{2}$ drachms) were given daily in divided doses in a potion, and of the latter, from 1 to 6 grammes ($\frac{1}{2}$ to $1\frac{1}{2}$ drachms). The remedy was well borne, even by the youngest infant. In the majority of cases the cure was as prompt as with quinine. Methylene blue was administered to 36 children, varying in age from 23 days to 14 years. A cure was obtained in 10 cases, amelioration in 3, while in 14 the results were not conclusive. The drug was given in doses of from 0.20 to 0.40 gramme ($3\frac{1}{4}$ to 6 grains), in four equal parts, in the course of the day. The medicament was well borne and only in 1 case caused transient vesical tenesmus.

Du Cazal³⁵ indorses the method of treatment of intermittent fever proposed by Boudin. This consists in the administration at the outset of sufficient of a solution of 1 part of arsenious acid in 1000 parts of water to equal 1 grain (0.06 gramme), continued until symptoms of intolerance appear,—nausea, colic, vomiting, diarrhoea. The daily amount is so divided that equal parts are taken, in water or in milk, every quarter of an hour from 6 or 7 o'clock in the morning until 7 or 8 at night. Symptoms of intolerance usually appear in from three to five days. Then the intervals of administration are doubled. In from forty-eight to seventy-two hours the intervals are again doubled and once more after

another eight or ten days. Under this method of treatment relapses are said to be exceptional.

Strizover,^{3 814} in the case of a woman with enormous hypertrophy of the liver, of malarial origin, in which other measures failed to give relief, made hypodermatic injections of the officinal solution of potassium arsenite twice a week, at first in doses of 2 drops, gradually increasing the dose to 12 drops. The œdema commenced to subside soon after the first injection and had disappeared after the twelfth, while the size of the liver was greatly reduced. Menstruation, which had been in abeyance for three years, was established in two months, and the spleen, which also had been enlarged, returned to its normal dimensions. The injections in time failing to bring about any further improvement, they were discontinued and potassium iodide administered until the cure was made more nearly complete.

Dall' Olio^{505 2} _{Jan. 14, Feb. 15} formulates as follows the conclusions at which he has arrived as a result of the employment of phenocoll in the treatment of malarial fever: 1. The drug does not appear to have potent antipyretic properties as regards fever in general, but it is at least as effective as quinine in the malarial state. 2. Whereas quinine, in a great many instances, gives rise to toxic symptoms, such as ringing in the ears and cutaneous eruptions, phenocoll has not been found to give rise to such unpleasant effects. 3. Phenocoll succeeds in a certain number of cases in which quinine absolutely fails; this is of importance if only from the fact that difficulty might arise in obtaining a supply of quinine equal to the demand, whereas phenocoll is producible in any quantity. 4. The taste of the drug can easily be masked by means of syrup, and is not objected to even by children.

Cucco^{116 80} _{Apr., Sept.} has employed phenocoll hydrochlorate in the treatment of 84 cases of malarial fever, giving the drug a few hours before the anticipated attack. In 52 cases the result was satisfactory; in 21 doubtful; in 4 the drug failed; and in the remainder a definite conclusion could not be reached. Seven and a half grains (0.5 grammes) were given twice or thrice a day. Vincenzo, of Sassari, Italy,³⁴ _{Nov. 29, 92} has found phenocoll useful in 5 cases of grave malarial fever that would not yield to quinine. The individual dose was from 0.2 to 1.4 grammes (3½ to 21 grains), and the total amount used from 3 to 7 grammes (½ to 1½ drachms).

Pruitt, of Russellville, Ark.,¹⁹² calls attention to the efficacy of a distilled extract of common Indian corn in the treatment of chronic malaria. After the corn has been gathered and well dried and freed from stems and mildew, 4 pounds (2 kilogrammes) of the husks, with 16 gallons (64 litres) of water, are placed in a still having a capacity of 20 gallons (80 litres). Ten gallons (40 litres) of the distillate are collected. The distilled extract is clear and transparent, and in odor and taste resembles boiled green corn. For purposes of preservation an ounce (31 grammes) of alcohol and $\frac{1}{2}$ ounce (15 grammes) of glycerin are added to sufficient of the extract to make a pint (0.5 litre). Of this mixture, the dose is from 1 to 2 teaspoonfuls every two or three hours. The medicament has not proved useful in cases of acute malarial infection, although it appears to act specifically in the chronic form of intermittent fever. The effects of the administration are speedily observed, the temperature soon declining, the irritability of the stomach subsiding, the action of liver and kidneys being favorably influenced, and the enlargement of the spleen being diminished. In many cases a mild diuretic effect may be observed.

YELLOW FEVER.

(From the ANNUAL for 1888.)

Freire¹⁰² presents a statistical table by which it appears that 6542 persons have recently been inoculated in Rio Janeiro with attenuated virus, and that, of this number, eight only subsequently contracted the fever, although a very serious epidemic was then prevailing. In contrast with this mortality of about one in a thousand of inoculated persons, there was a mortality of one in one hundred in persons not subjected to the treatment; consequently, according to the author's conclusion, nine out of ten were saved by the procedure.

Finlay¹⁰³ details the results of his bacteriological studies in yellow fever. He made, in connection with Delgade, numerous cultivations with the blood and secretions on agar-agar and broth. Orange-yellow and milk-white colonies of micrococci developed, either separately or together, in the course of the inoculating needle, forming, about the puncture on the surface of the jelly, a salient disk with fringed edges. The yellow colonies consisted of micrococci endowed with active movement, arranged singly and in groups of two or three. The micrococci of the white colonies were rather larger, elliptical in form, and of less rapid movement. These colonies were easily cultivated separately.

Lacerda¹⁰⁴ studied the bacteria found in the bodies of persons dying of yellow fever, and made cultures of the bacteria taken from parts of the tissue and the blood. He found bacteria in the form of small chains, formed by a series of granulations having nearly equal dimensions, an outline somewhat elongated and approaching the cylindrical. Characteristic of these bacteria, in contrast with all others, was the tendency to constantly present a ramifying arrangement. De Arenas¹⁰⁵ reported yellow fever in a monkey. The symptoms were well-marked and the case terminated fatally.

Hebersmith¹⁰⁶ treated cases of yellow fever with injections of pilocarpine muriate, in quarter of a grain doses, with very favorable and prompt results. The series of cases was, however, limited.

(From the ANNUAL for 1889.)

Etiology.—Hamilton ¹¹⁸⁹ _{Jan., '89} says: “Yellow fever is portable from place to place, is communicable to healthy persons, probably not by direct contact from the sick, but by the imbibition of specific germs. We might construct a reasonable hypothesis that it is feasible that the germs in sufficient number may be brought into the nasal air-passages of a person, thence to the fauces, thence washed into the stomach by the first drink of water or swallowed with the saliva, the saliva itself furnishing a culture-medium for the growth of the germ. We may conclude, then, having consideration solely to the fact that yellow fever is a highly infectious disease of the mildly contagious variety, and is to be prevented by the adoption of such measures as will destroy the germ and thus prevent its propagation, and at the same time rendering sterile the soil or place whereon the germ shall fall.”

Sternberg presented the results of his investigations of the method of inoculation practiced in Brazil and in Mexico, with the view of establishing in individuals protection against yellow fever. His own researches show that no such micro-organism as Freire, of Brazil, has described in his published works, or as he presented to Sternberg in his yellow-fever germs at the time of the latter's visit to Brazil, is found, as he asserted, in the blood and tissues of typical cases of yellow fever; that there is no satisfactory evidence that the method of inoculation practiced by Freire has any prophylactic value; that the claims of Carmona y Valle, of Mexico, to have discovered the specific cause of yellow fever, have likewise no essential basis, and that he has failed to demonstrate the protective value of his proposed method of prophylaxis.

Sternberg examined blood from numerous cases drawn from the finger during life in the fresh condition, in preparations stained by various aniline colors, and by culture methods. He also studied with great care a large number of thin sections of the liver and kidneys, stained by the most approved method, from a considerable number of typical cases of yellow fever, without having encountered the *cryptococcus xanthogenicus*. He states that in certain cases micro-organisms have been found. The one to which most interest attaches is that described by Babès. This was discovered

in 1884 in material sent to Paris from the laboratory of Lacerda in Rio Janeiro.

Guitéras¹¹⁹⁰ says that in the very beginning of the history of yellow fever we find the shadow of the malarial diseases as a source of difficulty and confusion. The time is past when it is necessary to prove that yellow fever and malaria are two distinct diseases; but we still have to contend against the imperfection of means of diagnosis, against preconceived opinions, negligence, ignorance, and even against dishonesty and political intrigue, to separate yellow fever from malaria. Children are peculiarly susceptible, and the prevalence of yellow fever among the children of yellow-fever countries is not exceptional; on the contrary, in early life there is a constant and special predisposition to the disease; it is a disorder essentially of white and creole children. Among them is to be found its natural habitat, their infection being no matter of accident. The accidents, the abnormalities in the natural history of the disease, are really the migrations to foreign soil and the migration of the foreign element to the native soil. The newcomers, newly born or newly arrived, are the victims. For the natives it is a process of evolution, and they stand it better; for the foreigners it is a revolution, awful and menacing, at the entrance to the loveliest gardens of the earth. The endemicity of the disease depends essentially upon the infantile and native population.

The question of the spontaneous origin of disease should not be allowed to obscure this subject. A focus of infection may for a time be entirely inoperative because it is inaccessible. The cleaning out of a house or the opening of an old drain may be the means of bringing into action the germ of the disease. The length of time that the poison may lie dormant in this manner has not been determined, but, the farther removed such outbreaks are from the last epidemic, the greater should be our suspicion that the cause of the outbreak should be looked for elsewhere. Such periods of absolute latency have probably never extended much over one year.

Freire claims that Gibier's negative results should not weigh against his positive ones. Though Gibier did not succeed in isolating the yellow-fever germ found by Freire, others have met with better success. To Sternberg he devotes but a foot-note,

saying that the American sojourned but a short time in Brazil at a time when there was no epidemic. He examined but one sporadic case and made no autopsy; in fact, he had not the materials from which to form an opinion of even mediocre value.

Wall²⁰⁷ reiterates the opinion that the idea of yellow fever being only a more malignant grade of malarial fever is entertained by none but superficial observers. He dilates upon the difficulties of diagnosis at the commencement of epidemics and insists upon the fact that there are practically two types of the disease to be met with in an epidemic,—one whose main feature is an acute parenchymatous nephritis, developed by the third day, and the other having no such complication and terminating with the first paroxysm of the fever, the patient being up and about as early as the fifth or sixth day. In the graver type of cases with a nephritic trouble no line of treatment after the third day promises any certainty of success. So long as the quantity of albumen in the urine remains comparatively small and the kidneys continue to act tolerably freely, there is encouraging hope of the patient's pulling through, though there are no means of telling when or how soon the action of the kidneys will become fatally impeded or suppressed and the case terminate in stupor, convulsions, and death, with or without black vomit toward the end.

Zimmermann⁸⁰ _{Oct. 16} advocates the treatment of yellow fever by mercurials. He prefers the bichloride and considers the hypodermic method of using it the only proper one in yellow fever and all other zymotic diseases.

Day¹² holds that measures for relief must be promptly resorted to. If the skin is hot or dry, or dry without being hot, the patient, being in bed, should be given a warm or hot mustard foot-bath under blankets to retain the vapor, supplemented by warm beverages, with a view of promoting diaphoresis. A laxative should be given in the beginning. Enemata of warm water with camphorated oil are preferable to castor-oil, or an infusion of senna-leaves with magnesium. If the attack begin with marked cerebral symptoms, such as profound unconsciousness or raving delirium, he recommends bleeding at the arm. If the tongue is deeply furred, the saliva thick, the right hypochondrium tender on pressure, the urine scanty, the eyes injected, the temperature high, respiration hurried, and there is pain in the head, back, and limbs,

he prescribes twenty grains (1.3 grammes) of calomel and from thirty to forty grains (2 to 2.6 grammes) of quinine, divided into four equal parts, one dose every four hours. For nausea or irritability of the stomach a fly-blister is to be applied, with small doses of morphine and enemata of water and bicarbonate of soda. If an hæmorrhagic tendency display itself or black vomit take place, the free use of the muriated tincture of iron with crushed ice and brandy, or champagne, is serviceable. If suppression of urine supervene, there is nothing better than dry cups over the kidneys and frequent frictions up and down the back with warm whisky, spirit of turpentine, and tincture of digitalis. Under this treatment he states that his death-rate has not exceeded from three to three and a half per cent.

(From the ANNUAL for 1890.)

Etiology.—Frank S. Billings ⁷⁶⁰_{Mar. 18 to July 22} claims that he has demonstrated the identity of the organism of yellow fever with that of the Southern cattle-plague in the United States, but without asserting any identity between the two diseases. Gibier ⁴⁰_{Apr.} details his bacteriological studies upon the causation of yellow fever, describing the bacilli which he claims to be pathogenetic. He calls attention to the fact that in the cases in which autopsy took place early after death, as well in Havana as in Jacksonville, the blood, liver, spleen, and the kidneys have constantly been found free from microbes, and claims that this fact strengthens the theory he has supported, that yellow fever is an intestinal infection which must be treated from the very beginning with evacuation and disinfection of the intestines by means of such agents as bichloride of mercury, naphthalin, and tannic acid. McWhorter ⁴⁴⁷_{Aug.} gives some points of analogy between yellow fever in the human family and Texas fever in cattle; the analogies extending, he claims, to the peculiar and specific poison of each, to the method of distribution of the two diseases and their clinical history, and, finally, to the anatomical lesions observed after death.

Maxwell ⁸¹_{July} reviews the yellow-fever epidemic of 1887 and 1888 in Florida. He dissents from the opinion of Surgeon-General Hamilton, that the fever was introduced into Key West by the bedding of the Bolio family. He quotes the opinion of John

P. Wall regarding the Tampa epidemic, viz., that the fever was introduced there among fruit dealers who obtained their fruit from small boats plying down the coast, all of which visited Key West and, on returning, evaded quarantine. He places the greatest responsibility upon the unsanitary condition of the city of Jacksonville and other places where the disease became epidemic. The treatment which he pursues is, first, a hot mustard foot-bath; second, stimulating diaphoresis; third, a purge of castor-oil; fourth, quiet and diet. "The alkaloid quinine and citrate of magnesia, with orange-tea containing bicarbonate of soda and sweet spirits of nitre," he says, "are beneficial for the fever when remittent fever is suspected." The idea that black vomit is certain death is a fallacy. If not accompanied by nasal and intestinal hæmorrhages the patients may recover,

Inoculation.—Gaston⁴⁰ defends Freire's inoculations and criticises Sternberg's report thereon. He says: "If it were a question of veracity between Sternberg and Freire as to the existence of a special yellow-fever microbe, it might be relegated to the domain of science, but it resolves itself now into a correct appreciation of facts by competent honest observers of the data presented." He translates a letter from Freire, which states that, in the epidemic prevailing at the time of writing, 2100 persons had been inoculated, of whom 1317 were persons recently arrived from abroad or from the Provinces, residing in Brazil some days or months and between one and five years. The mortality among these 1317 susceptible persons inoculated was only eight-tenths of 1 per cent, and of all inoculations this season only five-tenths of 1 per cent. The number of deaths among those not inoculated, from the commencement of the epidemic to date of writing, was 736. Granted that the majority of these 736 consists of individuals highly susceptible and comparing them with the 1317 who were inoculated, "it follows," says Freire, "that if these 736 had been inoculated only 6 among them would have died."

A correspondent, ⁶¹ writing from Sao Paolo, describes the yellow fever in Brazil in the epidemic of that year. He states that of 630 persons inoculated by Freire at Camfinas, 3 only were attacked, and these in a mild form; and that of those inoculated in Santos by Barrata, after the method of Freire, a very insignificant number had yellow fever.

Diagnosis.—Stub¹⁵⁰ treats of the diagnosis of yellow fever, basing his paper upon cases observed in the city of Brooklyn, at St. John's Hospital, and upon personal experience obtained in the year 1862 in Key West, Florida.

Cochran⁶¹⁷ calls attention to the importance of early diagnosis of yellow fever. Physicians who have no practical acquaintance with the disease almost always mistake the first cases for some form of malaria. He suggests that if a case of fever occur in a stranger, or in a traveler from an infected locality or from the neighborhood of an infected locality, it should be carefully studied from day to day until its character is decided, and an accurate record should be kept of the clinical phenomena observed. The pulse and temperature should be recorded twice daily, and, after the first day, the urine tested twice daily for albumen. The quantity of the urinary excretions should always be observed, so that any marked diminution may be promptly discovered. The symptoms most to be trusted as indicating yellow fever are these: (a) An initial fever of a continued or quasi-continued type, of three days' duration, with marked subsidence at the end of that time. (b) Want of parallelism between pulse and temperature, and, independently of temperature conditions, a subnormally low range of the pulse. (c) The appearance of albumen in the urine on the second, third, or fourth day. (d) Injection of the conjunctiva, stasis of the blood in the capillaries of the skin, yellow discoloration, and suppression of urine. In very mild cases the symptoms are so little marked that positive diagnosis may be difficult or even impossible. In cases of the severer but not malignant grade, the low pulse-range and the albuminuria are very reliable diagnostics. In Alabama, fever with black vomit may be accepted as yellow fever without further inquiry. The most misleading symptom is the discoloration, from which the disease gets its common name. Those not familiar with the disease think that every yellow-fever patient should be yellow; but the majority of patients do not show any decided yellowness at any stage of the disease. In the severer grade of cases it is not common before the third, or even the fourth or fifth, day. In a number of cases, even death may occur before the discoloration becomes marked; but in such cases the yellow discoloration appears post-mortem.

Diagnosis and Treatment.—Nelson⁶¹⁸ contributes a paper on

yellow fever based upon his experience in Panama on the Pacific and Colon on the Atlantic, both ports of the Isthmus of Panama; his studies and observations on the west coast of Mexico in 1885; his experience in the hospitals of Cuba; and his visit to Florida in the fall of 1887, when he forecast the epidemic which swept Jacksonville in 1888. In regard to treatment, he says that, on being called to see the patient at the outset, he made quinine a diagnostic agent, giving it in a solution containing dilute sulphuric acid, sodium sulphate, and compound tincture of cardamom. If the case is purely malarial the quinine and sodium sulphate meet all the indications. Every dose contains 15 grains (97 centigrammes) of quinine and half an ounce (15 grammes) of the salts. If after two days the temperature remained high (100° F.—37.77° C.—and upward) with the usual symptoms, yellow fever was the verdict. Later, he added to this treatment a phosphoric-acid mixture largely diluted with water, given every hour or two. To produce free sweating he resorted to vapor-baths, with the drinking of a pint of hot lemonade or orange-leaf tea. Nourishment was maintained by means of iced milk and beef-broth in very small quantities, at frequent intervals. The treatment was successful in 3 consecutive cases, nearly all cases treated otherwise having died.

Sternberg⁸⁰ records the results of an extended trial during the recent epidemics at Decatur, Alabama, and Jacksonville, Florida, of the treatment of yellow fever according to a method suggested by himself while at Havana. The formula referred to is as follows:—

R. Sodii bicarbonatis, gr. cl (10.00 grammes).
Hydrarg. chloridi corros., gr. $\frac{1}{16}$ (0.02 grammie).
Aquaæ puræ, Oij (1.00 litre).
Fifty grammes (1½ ounces) every hour. To be given ice-cold.

In Decatur were treated 32 whites, with 4 deaths; 32 colored persons, no deaths. This excludes 2 cases treated by Cross, in which the treatment was not commenced at the outset of the attack. Of one of these patients, a white male, recovered; the other, a white female, died. The general mortality among the whites alone was 30.92 per cent., the total general mortality being 29.22 per cent.; while in the total of 64 cases treated by the alkaline-bichloride method the mortality was only 6.45 per cent., and mortality among the whites, considered separately, 12.5 per cent. Deducting

from the total mortality the latter group, we find that the mortality of cases treated by other methods was 40 per cent. among the white and 20 per cent. among the colored population. From Jacksonville, records were received of cases treated at the Sand Hills Hospital by Sollace Mitchell, and of cases treated in private practice by A. J. Wakefield. Mitchell's statistics include 106 cases with 5 deaths, a mortality of 4.7 per cent.; 79 of the cases and all of the deaths were whites, a mortality of 6.3 per cent.; 27 cases were colored, with no deaths. Of the whites, 73 were males and 6 females. The deaths all occurred among the white males, and the mortality among these cases, considered separately, was 6.8 per cent. Yellow fever is well known to be especially fatal among adult males, and in hospital practice a mortality of less than 25 per cent. among this class of cases is exceptional. The general mortality, as shown by the daily records published in the newspapers, was nearly 10 per cent., but this calculation includes, in the total morbidity, negroes, of whom very few die from yellow fever. Mitchell reports the mortality among the white population as from 22 to 25 per cent. Wakefield treated 89 cases,—75 white and 14 colored. Five deaths occurred among the whites, a mortality of 6.6 per cent. Thirty-nine of the white cases were males and 36 females. Forty-one of the cases were classed as severe and 48 as mild. One of the fatal cases is said to have been a consumptive, another to have been convalescing and to have died from imprudence; concerning another the remark is made, "bad nursing, imprudence;" concerning another, "unfavorable surroundings."

Sternberg's object in suggesting the formula was to test a decidedly alkaline treatment from the outset of the attack, and also to render the highly-acid urine neutral or slightly alkaline, in the hope that the secretion would be somewhat more abundant and the tendency to suppression diminished. It appears to meet these important indications, and to save life by preventing those structural changes which give rise to haemorrhage from the stomach and suppression of urine,—two causes which are present in the majority of the fatal cases. Bichloride of mercury, in a comparatively small amount, was added to the formula, not with the idea that it would, to any extent, destroy pathogenic micro-organisms in the intestine, but as an antiseptic which might be useful in preventing fermentative changes in the stomach. The writer analyzes the

cases treated by the bichloride alone, according to the recommendation of Gibier, and a single series of cases in which sodium bicarbonate was administered alone. In both series the mortality was much greater than in those treated according to his recommendation.

Mitchell's experience with increased doses of both the ingredients from those of the original formula leads to the recommendation of the following modification:—

R Sodii bicarb., 3iv (16.00 grammes).
Hydrarg. chloridi corrosivi, gr. ss (0.03 gramme).
Aquaæ puræ, Oij (1.00 litre).
Fifty grammes (1½ ounces) every hour. To be given ice-cold.

It would be a mistake to substitute the potassium salt for the sodium in the above formula. The mercuric chloride, which remains in solution in the presence of sodium bicarbonate in the proportions described, would be precipitated. Moreover, potassium salts are directly contra-indicated in any disease in which there is so great a tendency to suppression of urine and uræmic poisoning. Martinez^{73; 12} states that treatment of yellow fever according to the method of Sternberg, with sodium bicarbonate and mercury bichloride, reduced the mortality more than one-half at the Mercedes Hospital in Havana. When patients are treated from the first day vomiting rarely occurs. Diuresis is maintained to a marked degree even in the severest cases. After the eighth or tenth day it is necessary to suspend the sodium bicarbonate, and to give stimulants and combat the adynamia and hæmorrhages, etc., with the customary measures.

(From the ANNUAL for 1891.)

Etiology.—Sternberg,¹¹ in a paper read before the New York Academy of Medicine, stated that extended researches as to the etiology of yellow fever, made during the preceding two years by the most approved bacteriological methods, gave only negative results. Most of the organisms found were not peculiar to yellow fever, being also found in cases in which death had taken place from other causes. He found one bacillus, however, in sections of the liver and in the contents of the intestine, in cases of yellow fever and under no other circumstances. Though not successful

in obtaining satisfactory experimental evidence, he rather looked upon this as possibly being the specific germ of yellow fever.

Treatment.—After using a number of drugs in the treatment of yellow fever at the Isthmus of Panama, with indifferent results, Thorington⁵ tried cocaine to overcome the nausea and vomiting, to which, in most fatal cases, death was due, and obtained gratifying results. Of 20 cases thus treated, 3 died, while the mortality previously had been about 50 per cent. The diuretic properties of cocaine commend its use in yellow fever, as suppression of the urine is a complication to be feared. The drug is best given in solution, on an empty stomach, and in anticipation of an attack of nausea. Ferreira,⁶⁷ reasoning from the conception of yellow fever as an intoxication from the intestinal canal, recommends the use of salol, in doses of $4\frac{1}{2}$ grains (0.28 grammes) every two hours, as an internal antiseptic, and reports 2 cases thus treated in which black vomit had already appeared and in which recovery resulted.

Gaston⁶¹ maintains his defense of the method of inoculation of Freire in the prophylaxis of yellow fever, and presents comparative statistics compiled by Freire. The first sporadic cases of the epidemic of 1888-89 appeared in the month of May, 1888, the last in June, 1889, while the epidemic attained its greatest intensity between December and March. Three thousand five hundred and twenty persons were inoculated, of whom 988 were strangers and 2532 Brazilians. Among the latter were 1680 from the interior, residents of Rio de Janeiro for less than six years, and children. The mortality was 0.79 per cent. Among those not vaccinated there occurred 4115 deaths [it is not stated among how many cases], of which about 2800 were in strangers and about $\frac{1}{4}$ in Brazilians. From 1883 to 1889, 10,480 persons were inoculated; from 1883 to 1884, 418; from 1884 to 1885, 3057; from 1885 to 1886, 3473; from 1888 to 1889, 3532, with a mortality of 4 per cent. The inoculations were interrupted during 1887 and 1888 because of the absence of Freire in Europe and the United States. Sternberg⁶¹ attacks these statistics as liable to convey false impressions. Using the figures of Freire, he is able to demonstrate that the mortality among the inoculated was really greater than among those not inoculated. He quotes an exposition of the fallacy of Freire's conclusions, presented to the Academy of Medicine of Brazil, and the opinions of the president and of a member of the Central Board of

Health criticising the work of Freire. It is shown that in one instance the inoculations were made late in the epidemic, when the survivors had already evidenced their insusceptibility to the disease.

(From the ANNUAL for 1892.)

Kemp⁷⁹ has reported the results of a microscopical, spectroscopic, and chemical study of the black vomit in 5 cases of yellow fever and in 2 of malarial fever, respectively, from which it appears that the source of pigment in each case is the pigment of the blood acted upon by the juices of the stomach. In addition, the matter vomited in case of malarial fever contains considerable quantities of bile-pigment and bile-salts, which are wanting in the vomited matter of yellow fever. It is postulated that, in a doubtful case, should the vomited matter be acid, containing coffee-ground flakes in a clear, colorless, yellowish or reddish fluid—the flakes constituted of red blood-corpuscles—and should the vomited matter contain no bile, the case is probably one of yellow fever. If, on the other hand, the vomited matter is feebly acid; is thick, grumous, and of a dirty, brownish-green color, and if bile be present, the probability is that the case is one of malarial fever.

Prophylaxis.—Cochran⁶⁴⁷ brings out the fact that, since the discovery of America, epidemics of yellow fever have occurred in the United States during ninety-three years, in eighty-one of which there was evidence of its source. Seventy-five times the disease was brought from the West Indies, especially from Havana. The best means of preventing its introduction consists in careful inspection and quarantine at the port of departure of vessels. In the absence of this, inspection-stations and refuge-stations should be established; the former to look after vessels coming from infected ports, but with clean bills of health and with no history of infection, and in regard to which the presumption is that they are not dangerous; refuge-stations should care for vessels without clean bills of health, or with a history of infectious disease during the voyage, or which, for some reason, are suspected of being infected. At inspection-stations provision should be made for scrupulous disinfection. Refuge-stations require, in addition, hospitals and warehouses. The process of disinfection includes (1) ventilation, (2) cleanliness, (3) sulphur-fumigation, (4) flooding.

with solutions of mercuric chloride, and (5) the application of dry and moist heat is to be directed to the ship, its ballast, the cargo, the baggage and bedding of the passengers, officers, and crew.

Protective Inoculation.—Finley and Delgado⁵ have, during a period of ten years, made a series of experimental observations upon the inoculation of 67 healthy persons—by mosquitoes—with the blood obtained from patients with yellow fever. They conclude that the inoculations are unattended with danger. The most pronounced effect was the development, in 18 per cent. of cases, of a benign form of yellow fever, with subsequent immunity. The inoculations are credited with the facility of acclimatization, observed in 94 per cent. of cases. Of the non-inoculated, but 65½ per cent. became readily acclimatized; of the inoculated, but 6 per cent. developed yellow fever, with a mortality of less than 2 per cent., while ordinarily the proportion is 19 per cent., with a mortality of 15½ per cent. The mosquitoes rapidly lose their infective power, which is intensified by successive stings of the same insect upon patients with yellow fever. Inoculations made during the cold season should not be considered sufficiently protective; they should be repeated on the approach of summer.

Treatment.—Le Roy de Méricourt⁶ describes a method of treatment for yellow fever, by means of cold, as carried out by Garcia, of Santiago. The patient is placed on low diet, in an inclosure with double walls, the space between which is packed with ice, until the temperature within has been reduced to between 10° and 0° C. (50° and 32° F.). It is conceived that the cold sterilizes the air of the chamber and accomplishes a lavage of the blood. Being rapidly absorbed by the mucous membrane of the respiratory tract, the air mixes with the blood, diluting the soluble poisons contained, increasing the renal tension, and acting as a powerful diuretic. Thirst is generally wanting. Of 20 patients treated in the manner indicated, only 2 died.

Freire⁶⁰ reports a mortality of $\frac{4}{10}$ per cent. among 10,885 cases treated by inoculation in the period from 1883 to 1890. It is stated that the majority of those inoculated were susceptible individuals, largely made up of recent arrivals in the theatre of infection. Freire makes yellow fever dependent upon the *amaril* microbe (*micrococcus* or *cryptococcus xanthogenicus*), an organism having a diameter of a micromillimetre, and appearing isolated or

in chains. The inoculations are made with attenuated cultures of this organism.

(From the ANNUAL for 1893.)

Guimera⁷⁷³ has employed the so-called cold chamber of Garcia in the treatment of two cases of yellow fever, and arrives at the conclusion that the method possesses no special advantages, while the apparatus required is rather expensive. The patient, well covered, except his head, is kept for twenty-four, thirty-six, or even seventy-two hours, in a chamber, of which the air is kept at a temperature of from 10° to —2° C. (50° to 28.4° F.) by means of ice. Food is withheld and a minimum amount of medicine is given.

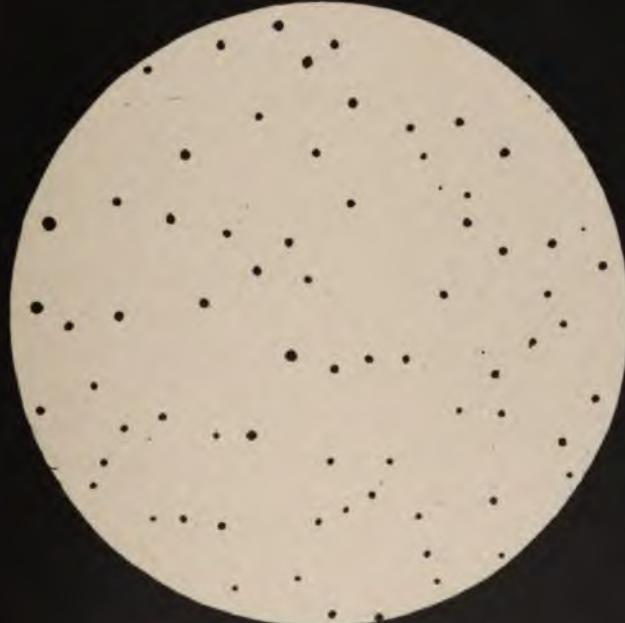
(From the ANNUAL for 1894.)

Diagnosis and Treatment.—Domingos Freire²⁰⁴⁸ points out the elements of differentiation between so-called bilious fever of hot countries and yellow fever. A typical case of yellow fever presents three distinct stages: A febrile period lasting, on an average, from twenty-four to forty-eight hours; a period of apyrexia of variable duration, but always short; and a third period, in which the temperature again rises and the haemorrhagic and ataxoadynamic phenomena appear. Bilious fever, on the other hand, pursues a course frankly periodic, either intermittent or remittent, —in the first case with distinct paroxysms, in the second with febrile exacerbations that manifest themselves in the evening or at night. In bilious fever jaundice is a constant phenomenon, and appears from the outset; while in yellow fever the yellowish discoloration does not appear until the third stage or toward the close of the second stage, and sometimes not until after death has taken place. In bilious fever the facies is not that of a drunken man, such as, to the practiced eye, is characteristic of yellow fever. In bilious fever the vomited matters are yellowish or greenish from the beginning and the vomiting subsides with the fever. In yellow fever the vomited matters are at first watery, toward the close becoming black or blackish, resembling burnt paper or soot, and not subsiding with the fever. In bilious fever the stools are yellowish or greenish in color, sometimes throughout the whole course of the illness, while in yellow fever there is constipation and only

Fig. 1



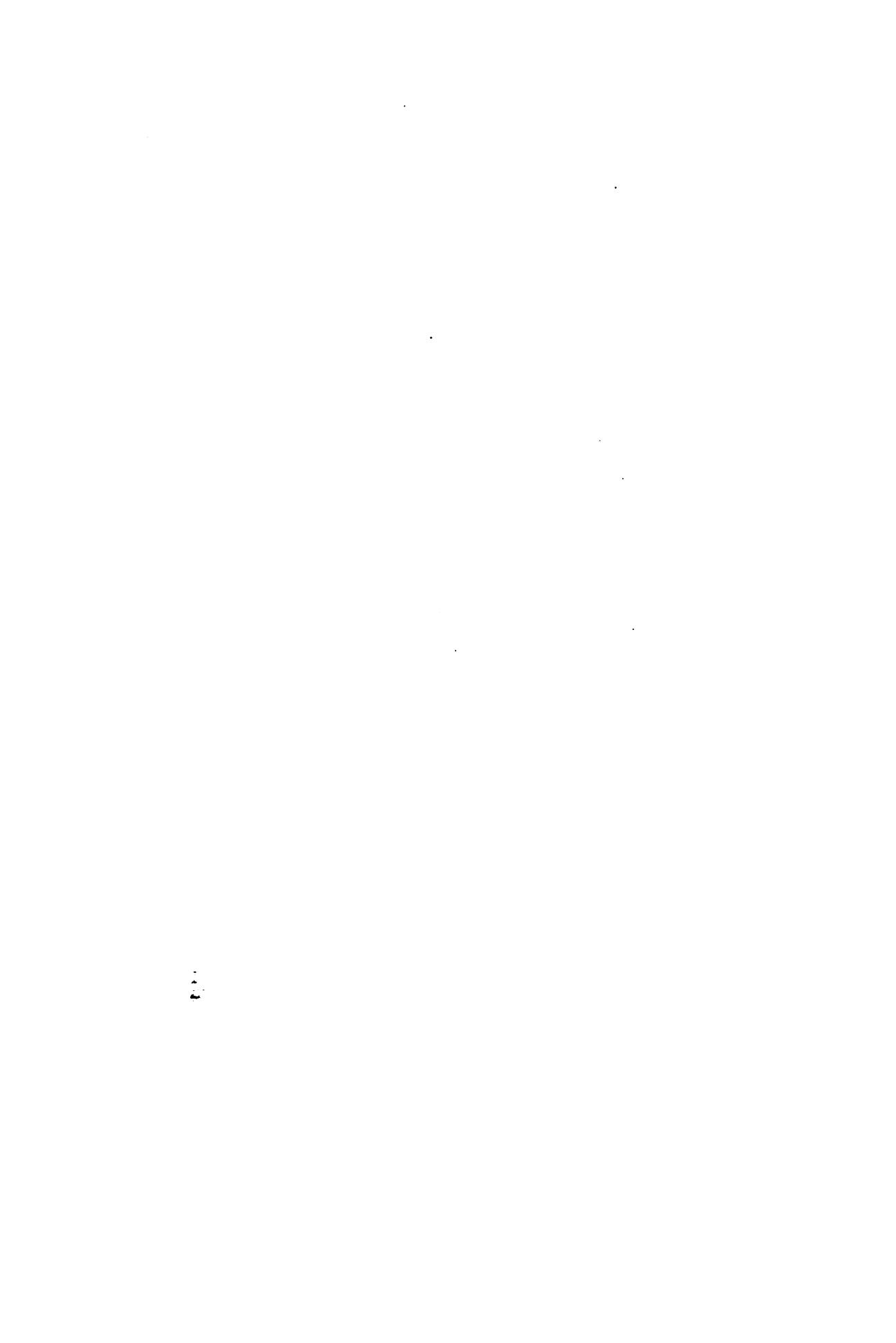
Fig. 2



Burk & Mifflin Co. Lith. Phila.

Fig. 1, Bacillus of Bilious Fever of Hot Countries; Fig. 2,
Micrococcus Xanthogenicus (Freire).

Origine Bactérienne de la Fièvre des pays chauds.



toward the close diarrhoea. Bilious fever cannot be considered infectious and is prone to recur and relapse, while yellow fever is contagious and not prone to recur. In yellow fever the spleen and the liver preserve their normal volume, unless they have already undergone changes from other causes, such as malarial infection. In bilious fever there is hyperæmia and congestion of liver and spleen; in yellow fever these organs undergo fatty degeneration, which is not the case in bilious fever. The salts of quinine possess distinct therapeutic value in cases of bilious fever, but none whatever in yellow fever. Freire succeeded in cultivating, from the urine, the blood, and the bile of cases of bilious fever, a bacillus 9μ long and 3μ thick, by inoculation of a culture of which he induced intermittent fever in a guinea-pig, which, in turn, presented the same organisms in its blood and kidneys and liver, and which is believed to be the etiological factor of the disease. In contrast, a colored illustration is presented of the micrococcus *xanthogenicus* (*Microcoque xanthogénique*), which Freire holds to be the etiological factor in the development of yellow fever.

Salicrup, of New York,⁵⁹ formerly a member of the Board of Health of Porto Rico, describes four types of yellow fever, based upon a personal experience of twenty-two years: (1) inflammatory, in which the predominant symptom is high temperature, which sometimes reaches an elevation of 105° F. (40.6° C.) at the outset; (2) nervous, in which in the third stage the symptoms of cerebral irritation, as delirium, tremor, cold skin, are the most prominent manifestations; (3) haemorrhagic, in which black vomit and other black evacuations are the most dangerous early symptoms; (4) typhoid, in which the disease in its third stage assumes features characteristic of the typhoid condition. The treatment pursued, in cases seen on the first day of the disease, consisted in the administration of 10 grains (0.65 grammes) of calomel, followed by a saline cathartic three hours afterward; as soon as the desired effect had been produced, the patient was directed to take a cupful of hot lemonade containing from 5 to 10 grains (0.32 to 0.65 grammes) of potassium bitartrate every hour until abundant perspiration took place. This was kept up by the continuous administration of the lemonade for several days, when ordinarily the fever had subsided and convalescence was established. Otherwise the treatment was largely symptomatic.

VARIOLA.

(From the ANNUAL for 1888.)

Symptomatology.—Cotugno,¹⁰⁷ in a recent epidemic of small-pox at Naples, encountered convulsions in all forms of the disease, and not only in the graver forms, as certain authors have pretended is the rule. The occurrence of convulsions is no criterion for prognosis; but the intensity, extent, duration, and frequency of attack furnish grounds for reasonable prognosis.

Montefusco¹⁰⁸ made studies in local thermometry in small-pox, which resulted in the discovery that in the splenic region there is a constant increase of temperature relatively, as compared with that of the hepatic region and the abdominal walls at large. There is no constant relation between the local temperature of the spleen and the axillary temperature.

Prevalence.—Dr. Beshara Manasseh, corresponding editor in Syria, writes that small-pox prevailed very extensively there during the year, among all classes of society, and was very fatal.

Dr. Neve, corresponding editor in Kashmir, India, states that the disease was also prevalent in Kashmir and the surrounding districts, the death-rate being not less than forty-nine per cent.

Treatment.—Œtrös¹⁰⁹ treated 315 cases of severe small-pox with xylol and obtained excellent results.

Vinay and Riche¹¹⁰ are partisans of the cold baths during the period of invasion and eruption. In the period of suppuration tepid baths are to be preferred.

Colleville¹¹¹ recommends a vaselin ointment of iodosform, of the strength of 1 to 20, not only as an antiseptic emollient grateful to the patient, but as somewhat anæsthetic and as preventive of the formation of foul-smelling scabs and of pitting.

(From the ANNUAL for 1889.)

Diagnosis—The Grisolle Sign.—At the onset of a papular eruption it is often difficult to decide whether the case is one of measles or small-pox. The following method is believed to be a certain means of determining by which of these diseases the eruption is produced: If, upon stretching a portion of the skin, the papule become impalpable to the touch, the eruption is caused by measles; if, on the contrary, the papule is still felt when the skin is drawn out, the eruption is the result of small-pox.¹⁴⁷ _{Feb.} The only test we have or can have as to whether vaccination has properly taken or not is a foveated and striated character of the cicatrix. The term vaccination is so frequently applied to the performance of the operation, irrespective of its results, that it becomes the duty of every vaccinator to examine the cicatrix to prove the genuineness and perfection of the operation. By observations made for many years in small-pox hospitals it has been demonstrated that the extent to which small-pox is modified by vaccination is determined by the number and character of these cicatrices; that it is in exact ratio to the excellence and completeness of the vaccination, as determined by these tests. Persons who have but one genuine vesicle are less protected than those having two or three, and the protection of those having four or five is almost absolute. The size of cicatrix is of no significance, as a small typical scar is much better evidence of protection than a large, smooth, and irregular one. That small-pox may occur after vaccination is generally conceded, but the degree of its severity will depend chiefly on the perfection of the protective means against infection of the system.¹⁰⁷ _{Feb.}

Amœba of Variola.—Van der Loeff¹⁰⁹ _{May} states that some matter taken from the pustules of confluent small-pox was placed in sterilized tubes, and on examination some hours afterward he found in it the same amœbæ that have hitherto been found in fresh vaccine-lymph from animal sources. Subsequent preparations also showed the identity of the forms.

Small-pox Among the Arabs.—Some curious details are embodied in a paper by M. A. Prengueber, of Palestro,² _{Apr.} on the spread of variola among the Kabyles, a native tribe of Algeria. They practiced inoculation by means of an incision between the

thumb and the index finger, which not infrequently degenerated into an ulcerated wound, slow to heal, and giving rise to phlegmonous erysipelas.

In one instance a native peddler, on his return from Algiers, developed characteristic symptoms of small-pox. Immediately the whole tribe rushed to his tent for the purpose of procuring the material for inoculation, and from this tribe as a starting-point the disease rapidly spread among the neighboring tribes far and wide. Among a population of thirteen thousand seven hundred and sixty-three, seven hundred and ten cases of grave and confluent small-pox occurred, with ninety-four deaths, equivalent to 5.2 per cent. of the inhabitants and 13.2 per cent. of the cases. Prengrueber recommends compulsory vaccination.

Treatment—Use of Calomel for the Prevention of Pitting in Small-pox.—Joseph Drzewiecki⁵⁹ states that calomel, applied as a powder on the face, does not prevent the development of vesicles from papules, but when vesicles or pustules are developed it causes them almost immediately to dry up, and in this manner prevents the formation of marks. How and why calomel acts in these cases is not definitely explained. However, we may suppose that possibly several agents have a share in producing this result. Perhaps the calomel acts partly as calomel, partly as corrosive sublimate, or partly, perhaps, as metallic mercury.

Acetanilid in Small-pox.—Hermann Haas⁶⁰ states that the employment of this drug, which he used in doses of two grammes (thirty grains) daily, given in solution, a tablespoonful at a time, every hour from ten in the morning until nine o'clock at night, always reduces the temperature during the critical hours of the afternoon from 1° to 2° C. (1.8° to 3.6° F.), and sometimes even down to the normal temperature, so that fever assumed the inverse type; that it greatly relieves and lightens all the accompanying symptoms of the fever; that it acts as a nerve-tonic and anæsthetic, relieving the patient from the miserable feeling of utter helplessness to which he is usually subjected. By means of its power to constantly reduce fever, it seems beneficially to influence the threatened degeneration of the parenchyma and strengthens the organism so that it can withstand the long-continued fever better. Its use is free from systemic disturbance. The chills, which several physicians have observed to follow the use of

antifebrin only occurred in a few instances after very large doses. Anaemic patients are more subject to them than others.

Iodoform ointment, in the proportion of one part of iodoform to twenty parts of vaselin, is much vaunted by Colleville.⁴¹ The most marked advantage of this ointment is that it prevents the formation of scabs, the odor from which is often so penetrating and offensive. In one or two days at the latest the pustules collapse, and there remains no subsequent cicatrix.

Carbolic-Acid Treatment of Small-pox.—A recent epidemic of variola at Naples has induced Montefusco⁵ to make trial of carbolic acid in the hospital Cotugno. The treatment consisted in the topical, as well as internal, use of carbolic acid. Local treatment consisted in the application of an ointment made by mixing carbolic acid with oil and carbonate of lime, which was applied with compresses in confluent patches. He concludes, however, that this practice is no more effective in its results than is the employment of the usual water compresses.

The internal use of the remedy, on the contrary, is found to be highly effective. It lessens the fever-heat, and in most cases the temperature remains low. In a few instances a severe rigor preceded a new exacerbation of fever, but no untoward accidents occurred. An impression is made on the eruption also, which becomes smaller in extent and matures earlier; the period of suppuration is shortened and the scab dries and falls off sooner than is usual.

Robin¹⁰ _{Sept. 23} has lately made a very interesting communication to the Academy of Medicine on the clinical urology of small-pox, —a question which had never been treated in a very systematic manner. He is led to establish four varieties of albuminuria: 1. Prevariolic albuminuria, occurring before the eruption. It is grave when pronounced. Only one case of the kind has ever been known. 2. Transitory albuminuria. This is but little marked and shows itself at the outset of the eruption and of suppuration. It is of no diagnostic or prognostic value. 3. Abundant albuminuria, coming on at any period of the acute stage. This is rare and of a grave prognosis. 4. Albuminuria of convalescence, which should be divided into two varieties. The first accompanies or precedes the febrile recrudescences of convalescence or a tardy complication,—abscess, parotiditis, etc. It is transitory, not pronounced, and

without serious prognosis. The second is analogous to post-scarlatinal albuminuria and, like this, proceeds from a particular form of nephritis termed variolic nephritis.

(From the ANNUAL for 1890.)

Little progress has been made in our knowledge of the etiology of variola. Several reports have been issued as to the finding of micro-organisms in the pustules; but none has been demonstrated to possess specific activity. The transmissibility of the disease, as well as its clinical behavior, points clearly to its infectious nature; while its well-known contagiousness bespeaks the transference of the virus through the air, whence it may be taken up through the mucous membranes, especially of the respiratory tract, and perhaps also through the skin.

The prophylactic virtue of vaccination receives constantly increasing recognition, and it is to be hoped that the time is not remote when vaccination and revaccination shall, under suitable conditions, be made universally compulsory. It may, for argument's sake, be granted that the individual has the right to assume the risk of infection, but he cannot be permitted to become the medium through which others may be attacked.

May,²¹¹ in reporting a local epidemic of variola at the Hôtel-Dieu (which apparently originated within the hospital, the first patient being a nurse who had not been outside for more than a month), strongly pleads for revaccination. Hoffman⁸⁸ argues that, as the infectious power of variola is most active in the stage of desquamation and comparatively feeble in the earlier stages, so, too, does the virulence of the disease communicated in the different periods vary. He would therefore isolate patients only after the eighth day, in order, first, to insure the vaccinated members of the family complete immunity by a comparatively harmless exposure, and, second, to infect the non-vaccinated members early with the mild form of the disease, rather than to expose them to the dangers, later, of the severe form. We reproduce this advice as a part of current theorizing. We do not indorse it. Prompt and thorough isolation of the sick and vaccination of every member of a household wherein the disease has appeared constitutes a far better plan.

Its Association with Other Infectious Diseases.—Arnozan¹⁸⁸
Mar. 24
 reports on the service of variola in the isolating pavilion of Pellegrin in 1888. There were 24 cases, of whom 22 had been vaccinated once, but only one revaccinated. In the latter, variola developed eight days after the second vaccination. The successful character of the second vaccination was capable of being made out by the usual characteristics at the point of inoculation. There is no doubt that the man was already infected with variola at the time of vaccination. In one case of recent syphilis this disease remained latent during the evolution of the variola, and, after the cessation of the fever of suppuration, resumed its activity so that syphilitic papules were noted amid the variolous crusts. In a child of 4 years measles occurred during convalescence from small-pox, and complete recovery from this took place while quite a number of the crusts of the original eruption were still undetached.

Treatment.—Lewentaner,¹¹⁶
June having previously lost all children affected with variola at Constantinople, used on the face, head, and neck of his 10-month-old daughter, a paste of carbolic acid (3 per cent.) in starch and oil of sweet almonds, applied by means of a linen mask. The trunk and extremities were frequently anointed with the following paste: Glycerin, 70; pure starch, 30; salicylic acid, 3. In addition, the following medication was employed, partly for local effect in the pharynx:—

R. Ol. amygdal. dulc.,	.	.	.	.	.	15.0 parts.
Syrup. aurant. flor.,	.	.	.	.	.	30.0 "
Aq. laurocer.,	.	.	.	.	.	10.0 "
Quinin. hydrochlor.,	.	.	.	.	.	0.3 part.

Solve in acid. hydrochlor. q. s. f. emulsio.

Sig.: Every quarter-hour to half-hour, several drops to be instilled into the throat while the child is recumbent.

Recovery took place, with scarcely noticeable cicatrices on parts not hermetically covered, as the upper portions of the alæ of the nose. Five other children were similarly treated with equally good results. The author claims that by this method the duration of the disease may be shortened, its intensity greatly diminished, and the danger of infection lessened.

Hartge,²¹
Nov. in mild cases of variola, covers the skin with cold compresses, and on the exposed portions uses Weidenbaum's pomade (mercurial ointment, 1; potassa soap, 2; glycerin, 4). The inunctions must not be made so energetically or so frequently as to

cause mercurialism. In severe cases he uses, in addition, tepid baths, repeated once or twice daily. Medication is tonic and symptomatic. Jacobi⁵¹ urges early vaccination and revaccination between the fourth and sixth years. In the treatment of children, among other measures, he advises frequent washing with cool or tepid water. Now and then an ether spray over sore parts will be agreeable. Superficial sores and those which yield an offensive odor should be treated with thymol, salicylic acid, or iodoform. Edema of the larynx or laryngitis may require intubation or tracheotomy at short notice. After disappearance of fever stage, the patient ought to be bathed every day, or every other day, and inunctions of fat made all over the surface until desquamation is complete.

Grandmaison¹⁰⁰ Dec. 1, 1888 contributes an interesting article on hæmorrhagic variola. He advocates the administration of hæmostatic medicaments such as perchloride of iron (30 drops in twenty-four hours), ergot (2 or 3 grammes—31 or 46 grains), tannin, Yvon's ergotin hypodermatically. For general stimulation he advises large doses of alcohol, with or without quinine, and ether in the form of syrup or hypodermatically. Oxygen may be given by inhalation, though Brocq prefers frequent oxygen-baths, so that patients may absorb from 1 to $1\frac{1}{2}$ litres (2 to 3 pints) per day. Excitation is combated with opium, chloral, or bromides; signs of collapse are an indication for ammonium carbonate or musk. When the general symptoms are intense, with nervous inquietude and inefficient cutaneous function, lukewarm baths are employed. If nervous excitation is marked or temperature high, the baths are cool. Mustard-baths are particularly useful when the skin functionates poorly. Pomades of boric acid or salol are used on the face and hands; antiseptic washes to the body generally. During convalescence antiseptic baths (boric acid) are used every two or three days.

Baudon⁶⁷ May 15 reports a case of confluent variola successfully treated with salicylic acid. Thrice a day the following pomade was applied to the face, limbs, and thorax: Vaseline, 225 grammes (7 ounces 2 drachms); salicylic acid, 10 grammes (154 grains). After which the following powder was applied: Talc, 250 grammes (8 ounces $\frac{1}{2}$ drachm); salicylic acid, 10 grammes (2 $\frac{1}{2}$ drachms). In addition, quinine sulphate was given in doses of 25 centi-

grammes (3½ grains) thrice daily, borated gargles were employed, and milk given at discretion. Recovery was perfect and the skin showed no vestige of the disease. The peculiar odor of the disease was not manifested.

Muselli¹⁸⁸ Mar. 21 presented a young woman who had recovered from confluent small-pox without a scar on the face, which result he attributed to the local use of Lebœuf's "coal-tar saponine." [This is not very different from a 5-per-cent. emulsion of liquor carbonis detergens.]

Sellwood²⁰² Jan. 25 states that in small-pox hospitals at Shanghai and Hong Kong quinine is given in 3-grain doses (20 centigrammes), thrice daily, throughout the disease. When the eruption is thoroughly established, an ointment composed of equal parts of citrine ointment and vaseline is applied over the whole body every few hours, the skin never being allowed to become dry and harsh. Pyrexia is controlled with aconite. The diet consists of light food and fruit. Stimulants are given only when peremptorily called for by shock or great prostration.

Ory³⁵ No. 9, Apr. 12 gives his results obtained with cocaine in the treatment of variola and varioloid. In an extremely severe case of confluent varioloid immediate improvement and arrest of evolution of the papules were observed after the patient had taken somewhat over 10 pastilles containing each $\frac{1}{2}$ grain (2 milligrammes) of cocaine.

Further treatment consisted in the administration of 10 drops of a 5-per-cent. muriate-of-cocaine solution, which dose was repeated four times daily; in less than ten days the patient was cured. In a second case of varioloid a cure was effected by the same method of treatment five days after the eruption first made its appearance. A third case of severe haemorrhagic varioloid healed without scars after five days' treatment. Also in 2 cases, occurring in children, a cure was effected after five and six days, respectively. The author administers to adults 10 drops of a 5-per-cent. solution four times daily; to children, four times daily, 8 drops of a 1-per-cent. solution. It is often difficult to make a positive distinction between cases of variola and varioloid, as the pustules dry up immediately after the application of the cocaine. The fact that cocaine is capable of neutralizing the variola virus in the infected body has led the author to believe that it can prevent infection of the healthy

organism, and that it should be used as a preventive remedy in the immediate surroundings of the sick-chamber.

G. Somma, of Naples, corresponding editor, writes us that A. Bianchi ³⁷⁶ _{V.45, N.6} warmly recommends the aseptic treatment of small-pox, which consists (1) in rendering aseptic, as much as possible, the whole surface of the patient during the course of the disease; (2) in keeping aseptic the blankets which cover the patient and the sheets on which he lies; (3) in keeping aseptic the atmosphere and the walls of the sick-room. The author says that by this method he cured 76 cases of small-pox (22 light, 15 very grave, and 39 grave cases).

(From the ANNUAL for 1891.)

Etiology.—Fleming, ²² _{July 30} while admitting the interrelationship of the variolæ of various animals, denies their identity. Though, by transmission from one species of animal to another, they may be modified in their clinical features, in accordance with the nature of the soil in which the virus is implanted, when retransferred to their own native soil they exhibit all their original distinctiveness and individuality. In addition, the virus of one may protect from or antagonize the virus of another. The variola of sheep presents the closest resemblance to the small-pox of man, but the two are not identical. The one will neither produce nor protect from the other. Horse-pox can be inoculated in the cow and in man, in one instance producing cow-pox, in the other vaccinia. Small-pox, however, is not transmissible from man to the lower animals. Neither can Fleming find any analogy between the cow-pox and human syphilis.

Hillmantel ⁷⁷⁹ _{Dec. 29} reports an epidemic of small-pox at Missoula, a town in Montana, between August 2 and October 23, 1889, during which 19 cases occurred. The histories of 13 in which recovery took place are given, but it is not stated whether there were any fatal cases or not. The author himself was inoculated through an abrasion of the skin, being compelled to go to bed for two days, the site of inoculation becoming indurated and a vesicle forming at the spot. The adjacent glands were swollen and painful, the temperature rose to 102° F., and there were headache, backache, and general malaise. The origin of the epidemic could not be traced.

Classification.—Huchard ³ _{Apr. 2} proposes the following classifica-

tion: varioloid, characterized by an absence or moderation of the fever of suppuration; discrete variola, characterized by a limited number of pustules (thirty to forty) on the face (the clinical index of the case); coherent variola, in which the pustules are in contact, but not fused, with one another; confluent variola, in which the elements of the eruption run into one another from the beginning; primary haemorrhagic variola; secondary haemorrhagic variola. Based upon this classification, Huchard deduces the following conclusions as to prognosis: recovery always occurs from varioloid; discrete variola may assume gravity from complications, but usually terminates in recovery; coherent variola and secondary haemorrhagic variola are grave conditions, not necessarily fatal; confluent variola and primary haemorrhagic variola are always fatal.

Complications.—Chiari²² has examined the testicles of 62 patients with small-pox,—in 13 during the period of eruption, in 28 during that of suppuration, in 14 while desiccation and desquamation were taking place, and in 7 during convalescence. In 45, orchitis was present. Examined microscopically, the testicles presented three zones, corresponding to those of the variolous pustule: a central zone of necrosis, a middle zone of infiltration and cell degeneration, and an outer zone of exudation. As suppuration does not occur, absorption must take place. Chiari concludes that, since orchitis is so common in small-pox and the lesions are so similar to those in the skin, the inflammation of the testicle is a specific manifestation of small-pox.

Balzer²³ reports the case of an anæmic and cachectic woman of 23, with intense secondary syphilis, in whom vaccination was followed by a local slough, with the formation of an eschar, which only disappeared after the administration of large doses of iodide of potassium. Balzer's explanation was that a syphiloma developed at the site of vaccination.

Treatment.—As a means of favorably influencing the pustules of variola, so as to reduce to a minimum the risk of cicatrices, Talamon²⁴ has applied ethereal solutions of various antiseptics by means of a spray apparatus. He rejected iodoform on account of its odor, and tannin because of the painful contraction to which it gave rise. Salol does well only when the eruption is slight and scanty. In all other cases, corrosive sublimate is to be preferred. Talamon uses a solution containing—

Corrosive sublimate,
 Citric acid, as 1.00 grammes (15 grains);
 Alcohol (90 per cent.), 0.50 centimetre (8 minims);
 Ether, . . . sufficient to make 50 cubic centimetres (1½ ounces);

which may be sprayed three or four times a day until desiccation takes place. An application of a minute usually suffices, the eyes being protected by tampons of cotton squeezed out of a saturated solution of boric acid. In the intervals, glycerole of corrosive sublimate (1 to 15) may be applied. In grave cases of variola, and in those in which the eruption is confluent, the patient is given tepid baths, 30 grammes (1 ounce) of corrosive sublimate being added to the quantity of water usual for a bath. When the mouth and pharynx are the seats of eruption, antiseptic gargles should be used. To prevent or modify the formation of disfiguring cicatrices in small-pox, Bertrand,^{100, 11, 11} recommends the application, by a brush, of a mixture of 4 grammes (1 drachm) of boric acid to 50 (1½ ounces) of glycerin, as soon as the eruption appears, either on the face or in the pharynx. The eyes are bathed with a tepid saturated solution of boric acid.

(From the ANNUAL for 1892.)

The testimony is rather conflicting as to the identity or the non-identity of variola, cow-pox, and vaccinia. If, as has been reported, cow-pock can be induced by inoculation with pus obtained from a case of small-pox, the virus must undergo some change in the body of the lower animal, for human inoculation with bovine lymph is not known to give rise to variola.

While the prophylactic virtue of successful vaccination is fully admitted, it must not be overlooked that the immunity thus conferred is not an absolute or a permanent one. Some individuals are more, some less, susceptible to the infection than others, and the frequency of revaccination should be governed accordingly. Even one who has passed through an attack of small-pox should be vaccinated from time to time. In times of epidemic it is a wise precaution to make vaccination universal. The treatment of the disease proper is expectant-symptomatic, although antiseptic applications seem to prevent the disfiguring results of the eruption.

Eternod and Haecius^{12, 13} claim to have succeeded in inducing cow-pock by inoculation of calves with virus obtained from cases of small-pox in man. They ascribe their success to their

method of procedure: vaccination by denudation, as they call it. The skin of the animal, in an area of several square centimetres, is carefully washed and shaved, and then scarified by means of glass-paper. The little blood and the little serum that appear are wiped away, and to the denuded surface the virus is applied by means of a spatula. As a result of their experiments, Eternod and Haccius maintain that variola is inoculable in the bovine species when the mode of operation is good and the virus is obtained at the proper time. The inoculation of variola in calves constitutes a valuable means of supply of animal vaccine, and in the course of several generations becomes transformed into cow-pock. By virtue of an enormous and extensive experimental experience, Chauveau ¹⁰ _{60,20,27} insists upon the rigid distinction of variola and vaccinia. He repels the attempts to consider the virus of vaccinia as either a transformation or an attenuation of the virus variola. He maintains that the virus of vaccinia never gives rise to variola in man, and that the virus of variola never gives rise to vaccinia in the cow or in the horse.

Molitor ⁴⁵⁴ _{Sept.} formulates the following conclusions, based upon the vaccination of the recruits and soldiers of a garrison for the year 1890: It is important to vaccinate the newborn as early as is possible. Children should be revaccinated at about 5 years of age. Persons who have had small-pox should be vaccinated four or five years after the attack if the disease has been contracted in early infancy; but if the attack has occurred after 5 years of age, vaccination should be performed after an interval that should not exceed eight years, or at most ten years. Some persons present a remarkable vaccino-variolous tendency that is only to be overcome by frequent revaccination. Such instances are probably not as rare as one might believe. In more than 6000 cases the number was about 2 per cent. It is thus prudent to make a test revaccination, preferably at an early age. Persons who present this tendency should be revaccinated every two or three years, until the protection is absolute. If the test revaccination is negative, it suffices to repeat the operation after an interval of from seven to ten years, according to the age of the subject. Under all circumstances, the first revaccination should be made not later than five years after the primary vaccine inoculation.

Steel ⁶ ₁₈₈₁ records 3 cases of accidental vaccination. Two oc-

curred in mothers whose children had been vaccinated, and the third in a milkman who had milked a cow with an eruption on its udder and teats supposed to be cow-pock. Darling² describes the case of a farm-servant, 17 years old, who had been successfully vaccinated as an infant, and who presented on the hands and lower lip vesicles that ruptured and dried up and formed crusts. Careful inquiry disclosed the fact that the girl had milked a cow that presented sores on its teats, from which infection had taken place through fissures of the skin. Felkin and Buist³⁶ reported 9 and 3 cases, respectively, in which persons were accidentally vaccinated by contact with the virus from the pustules of other individuals vaccinated in the usual way.

Jacquemard²²⁸ has reported 194 cases of variola in males, seen in the course of an epidemic. Six cases were haemorrhagic. These were in individuals between 31 and 50 years of age. Three of these had been successfully vaccinated at an early age, but had not been revaccinated. One had been vaccinated at an early age, and successfully revaccinated two years previously; another had been vaccinated twice, the last time twenty-six years previously; in the sixth case it was not possible to learn if vaccination had been performed, nor could a cicatrix be discovered. Five of the cases terminated fatally; 1 after copious haemorrhage. In 4 of the cases the urine was albuminous. There were 32 cases of confluent variola; these were mostly in individuals between 10 and 30 years old. Fourteen only had been vaccinated in childhood; 11 had not been vaccinated at all. Among the 32 cases there were 14 deaths, of which 4 occurred in individuals vaccinated at an early age and 8 in those who had not been vaccinated at all. Thirteen cases presented albuminuria. Sixty cases of discrete variola were treated. The largest number of these were also between 10 and 30 years old. Thirty-three had been vaccinated only once,—at an early age; 2 had not been vaccinated at all; in 21 cases the matter of vaccination was doubtful. In 12 cases the urine was transiently albuminous. Among the 60 cases there were 2 deaths,—1 from erysipelas and 1 from capillary bronchitis and catarrhal pneumonia. There were 96 cases of varioloid, of which nearly five-sixths were between 10 and 30 years old; one-sixth were between 30 and 40. Ninety of the 96 had been vaccinated; 75 had been vaccinated at an early age, but had not been subsequently revacci-

nated. None of the cases died. Therapeutically, all of the cases were divided into two classes. In the one only a tonic treatment was employed; this included quinine and alcohol. In the other class of cases methods of treatment for which specificity had been claimed were employed; these included cocaine and a spray of corrosive sublimate. The latter was found to possess no decided advantage over the former. Cocaine exercised a palliative influence upon the pains of the engorged skin at the onset of the eruption, while the spray of corrosive sublimate seemed to exercise a favorable influence upon the suppurative stage of the disease and in the prevention of deep cicatrices.

According to Neve,⁵ periostitis, epiphysitis, necrosis, and arthritis may occur as sequelæ of the exanthemata, especially small-pox. They usually, but not invariably, appear late in convalescence. Arthritis is the lesion most characteristic of small-pox.

Boinet⁷² has reported the case of an anæmic woman, 32 years old, in whom symptoms of cerebro-spinal sclerosis developed as a sequel of variola. He excludes hysteria, and considers the case as one of pseudosclerosis.

(From the ANNUAL for 1893.)

Incubation.—Schnell⁴⁶ has reported the case of a woman admitted to hospital with symptoms thought to be of malarial origin. After a day a variolous eruption appeared, and the patient was at once isolated. Fourteen days later, another woman, occupying a bed in the ward in which the first patient was received, was seized with fever, pain in the back, and vomiting, and a variolous eruption appeared on the following day. On the same day another woman in the same ward became ill, a variolous eruption appearing two days later. The two secondary cases were able to be out of bed during the day, and may possibly have come in contact with the original case of variola.

Clinical.—Biedert³⁶⁶ emphasizes the occasional difficulty of differential diagnosis between varicella and modified variola, the one affection at times being unusually violent, while the other is sometimes exceptionally mild. From a considerable experience he has found that before the stage of eruption variola is little or not at all contagious, and varioloid even less contagious than variola. Some individuals, even when not vaccinated, are but slightly

susceptible to infection with variola ; while others are so strongly predisposed that vaccination will succeed after an interval of one or two years. In most persons the protection afforded by vaccination lasts for seven years ; in some, even longer. The protective influence begins about a week after successful vaccination ; vaccination after infection has taken place does not protect, but vaccination practiced seven days before the appearance of the eruption may favorably influence the course of the attack. Children should be vaccinated early and repeatedly, as they may readily be the means of spreading the disease. The greater the number of unvaccinated and not revaccinated persons in a community, the greater the danger of outbreak and spread. Isolation and disinfection can only aid in the control of an epidemic when conjoined with immediate vaccination of those that come in contact with cases. Thorough ventilation, as well as sufficient movement in the open air and change of the outer clothing on the part of those that come in contact with the sick, will diminish the danger of contagion ; the danger can only be removed by disinfection of all personal effects by means of steam. Treatment with the fumes of sulphur exerts a beneficial influence.

Spehl ⁸⁶⁸ Denkschr. has reported two cases of malignant hæmorrhagic variola during an outbreak of rather mild character. One occurred in a woman, 47 years old, vaccinated in infancy, but not revaccinated, who had been under observation on account of an attack of acute articular rheumatism, with a tendency to recurrence. The woman finally seemed about to improve, when, two months after she first came under observation, a diffuse scarlatiniform eruption appeared, together with severe pain in the back. The temperature rose considerably, and the urine contained a small quantity of albumen. To the redness swelling was added ; and soon a number of vesicles, of variable size and filled with blood, made their appearance, together with numerous small, hard, bluish-black papules. Three days after the onset the patient died. At the post-mortem examination extravasations of blood of various volume were found : into and beneath the skin, in the lungs, beneath the conjunctiva, between the muscles, in the joints, in the mesentery, and beneath the mucous membrane of the stomach and intestines ; the left pleural cavity and the pericardial cavity contained blood-tinged effusions. Several of the joints presented inflammatory changes

of a destructive character. The case was considered to be one of haemorrhagic variola with purpura. The second case occurred in a man, 36 years old, likewise vaccinated in infancy, but not re-vaccinated, who, after five days of headache and backache, presented a scarlatiniform eruption, soon followed by a diffuse red-wine coloration of the surface. The constitutional symptoms were correspondingly profound. There were no papules. The man died twenty-four hours after the appearance of the eruption and five days after the onset of the first symptoms. At the post-mortem examination extravasations of blood were found beneath the conjunctiva, the pleura, and the mucous membrane of the gastro-intestinal tract. Bloody fluid was also found in the genito-urinary tract. The case may be considered as one of purpuric variola. Gasparini ⁶¹⁶ _{No. 18; July 5} ¹⁷ has observed uterine haemorrhage in female children suffering with variola who had not previously menstruated. He has likewise observed similar haemorrhage to take place in women that had already passed the menopause. Abortion occurring in the course of an attack of variola is usually attended with more than the ordinary amount of haemorrhage. Amenorrhœa is the rule in women that have safely passed through an attack of variola. The secretion of milk is suppressed in nursing variolous women. Destrée ⁸⁶⁸ _{May 7} calls particular attention to a petechial eruption that may appear early in a case of variola, sometimes before the usual eruption is sufficiently well defined to be of diagnostic significance. The petechiae have their seat of predilection in the groins, in Scarpa's triangle, and on the lower portion of the abdominal wall. The spots are about as large as pinheads, do not disappear on pressure, and have a tendency to coalesce, without, however, forming a perfectly continuous eruption. They disappear as the regular eruption makes its appearance. The petechiae seem to be most common in neurotic patients; they are apparently of favorable prognosis, not being observed in grave cases; they appear in situations in which the ordinary eruption does not subsequently appear. On the anterior aspect of the chest, near the axilla and the lower border of the great pectoral muscle, the pustules undergo early umbilication.

Variola in the Fœtus.—Lambinon ²⁵⁶ _{June 15; July 30} ² has reported the case of a primipara, 24 years old, vaccinated in infancy, who was attacked with discrete variola in the sixth month of pregnancy and

made a good recovery. Foetal movements were, however, thereafter no longer perceived. In the seventh month labor set in, the feet presenting. The membranes were ruptured, and the child was extracted. It was in a state of advanced maceration, and presented characteristic variolous pustules on the back, arms, and thigh, the face escaping. The placenta came away ten minutes after the expulsion of the child. The uterus contracted poorly, so that an intra-uterine douche of hot water and a subcutaneous injection of ergotin were given. The woman made a good recovery, and was dismissed on the ninth day.

Accidental Cow-pox.—Sympson, of Lincoln, ^{Jan. 16}² describes the case of a farmer's wife, who, several days after milking the cows and pricking a finger, noticed a small, hard, painful pimple at the point of injury. Soon the hand began to swell and the pimple to enlarge. Then fever set in and rigors occurred. As it was thought that the pustule was dependent upon the presence of a thorn, an incision was made, but no pus was found. The pustule became transformed into a vesicle. The arm became swollen and the lymphatics prominent. The temperature was high, the tongue was coated, and there was headache and nausea. The axillary glands became enlarged. After running a course of ten days the symptoms began to subside, and the condition gradually improved. A prominent cicatrix marked the seat of the local process. On investigation, it was learned that one of the two cows that the woman had milked had, four weeks previously, presented a number of pimples on the udder and teats; these became blisters, which were ruptured in the process of milking. The teats became large and swollen. Dark-red scabs appeared on the sores; on disappearing, leaving well-marked scars. Then the second cow went through the same stages. In both instances the milk was greatly lessened in quantity and poor in quality, and was thrown away. The woman had not been vaccinated since infancy.

Diagnosis.—Freyer ⁵⁸ _{Aug. 20} has conclusively demonstrated the non-identity of variola and varicella. He obtained the contents of some twenty vesicles from an undoubted case of varicella, rubbed up the fluid in a mortar, together with a little glycerin, and, with the mass, inoculated a calf. A little redness appeared at the point of inoculation, but nothing like the result that follows inoculation with the contents of a variolous pustule. Eight days after the

inoculation with the varicellous fluid the same animal was inoculated with vaccine, responding in the characteristic way. Freyer also relates that he repeatedly vaccinated successfully children who had recently had varicella, in some cases the crusts still being present. Two children actually developed varicella after the vaccination had proved successful.

Complications.—Sottas¹⁰⁰ _{Apr. 12} has reported the case of a man, 18 years old, with a good personal history, but of whom the mother, a brother, and a sister were epileptic, who, during an attack of discrete variola of moderate intensity, presented symptoms suggestive of meningitis. He became comatose and generally paralyzed; speech was slow, but dragging rather than scanning, consonants being articulated as in bulbar paralysis; the tongue was moved sluggishly, and presented fibrillary movements at the tip. There was slight nystagmus, without tremor of the head. The patient had greatly emaciated. The paralysis gradually disappeared, and was replaced by inco-ordination of movement, with intention tremor. The reflexes were exaggerated, and a tendency to contracture developed. In the course of time the clinical picture of cerebro-spinal sclerosis became better defined. The function of the sphincters was preserved. Sensibility was not deranged. Trophic symptoms were not present. Intelligence was impaired. Combemale³⁶⁰ _{June 25}² has reported the case of a girl 20 years old, in which, on the twelfth day of an attack of variola attended with high temperature and marked delirium, a certain slowness of speech was noted; the voice was somewhat nasal in character, and there was slight transitory strabismus. The uvula deviated to the left and was insensitive. There was considerable difficulty in formulating answers to questions. On the twenty-fifth day the difficulty in speech persisted and the left upper eyelid drooped a little. The labial and dental letters were poorly enunciated. After two months considerable improvement had taken place. Destrée⁸⁶⁸ _{May} has recorded the case of a girl 5 years old, never vaccinated, in which, in the midst of convalescence, about ten days after the establishment of the period of desiccation, paralysis of the right arm was observed, lasting for three weeks, and then gradually disappearing under tonic treatment.

Variolo-Vaccinia.—By inoculation of calves with the virus of the pustules of variola and transmission through several genera-

tions, Haccius and Eternod,¹⁹⁷ have succeeded in producing pustules indistinguishable from those of true cow-pox, the virus of which, when inoculated upon human beings, gave rise to vaccinia. Man or lower animal, inoculated with either virus, is protected against the other. The conclusion to be drawn is, that the virus of variola, in passing through the animal organism, undergoes some transformation or modification, as a result of which it is deprived of its malignity. Hime, of Bradford,¹⁹⁸ has repeated the demonstration that cow-pox is but modified small-pox, and that the two are reciprocally protective. By inoculating a calf with the contents of variolous pustules, he succeeded in bringing about pronounced constitutional manifestations, with the appearance of a typical variolous eruption; and, by inoculating human beings with the contents of these pustules, he was able to produce a typical vaccinia. Inoculation of the calf with good fourth-day calf-vaccine proved unsuccessful, indicating that the animal had been rendered refractory by its previous variolation. A second calf, inoculated with virus obtained from the first, developed typical cow-pox. Matter from this animal also demonstrated its ability to induce vaccinia in the human being. An attempt to vaccinate one of the children previously inoculated with some of the matter from the second calf proved unsuccessful, in demonstration of the protective influence of the inoculation. A third calf was successfully inoculated with matter from the second calf, and a fourth calf from matter obtained from the third.

Vaccination.—Boucher²⁰⁰ has reported the case of a child, 6 months old, in a family in which two sisters were convalescing from mild attacks of variola, who presented a temperature of 40.4° C. (104.7° F.), with sleeplessness, agitation, and incessant vomiting. The day before there had been a red eruption upon the chest that had been thought to be scarlatinal. The child, as well as other members of the family, was at once vaccinated. On the following day an almost confluent variolous eruption appeared upon the face and, a few days later, upon the abdomen and thighs. In the course of a week, however, the child was practically convalescent. It had previously not been vaccinated, and it is only reasonable to ascribe the mildness of the attack to the vaccination practiced at the onset. None of the other members of the family was attacked. Gill, of Clifton,²⁰¹ has prepared a

table of 288 cases in which pitting after small-pox was present, encountered among more than 10,000 patients of both sexes, at all ages. Of the 288, 158 had not previously been vaccinated; of these, 132 were badly marked. Of 98 in which it was stated that vaccination had been practiced, 63 were badly marked. If additional evidence of the utility of vaccination were wanting, it is to be found in the report of an epidemic of variola by Destrée.⁸⁶⁸ Of 185 cases, 16.6 per cent. were never vaccinated, 78 per cent. were vaccinated in infancy, and 5.4 per cent. were vaccinated more than once. Of the first group, 37 per cent. terminated fatally; of the second group, 2.4 per cent.; and of the third group, not one died.

Treatment.—Having observed that the saliva, in cases of variola, is both abundant and of acid reaction, and that the pustules that form in the mouth disappear earlier than those elsewhere, and without leaving cicatrices, Coste, ⁶⁷ of Marseilles, concluded to employ boric acid topically, for the purpose of preventing disfiguring cicatrices. Upon the face he placed a large piece of borated lint, provided with openings for the eyes, nose, and mouth, which he saturated, by means of a spray, with a solution of boric acid. Over this was applied a second layer in the same way as the first, and over the second a third. The irregularities of the face were filled in with pledges of cotton saturated with boric-acid solution. All were covered with a sheet of wax-paper or rubber cloth, and the entire dressing was held in place by a gauze bandage. The hair of the face must, of course, have been previously cut close. It was necessary to spray the coverings of the face every four or five hours. That next to the skin is to be removed as soon as it becomes soiled. By this means the intensity and duration of the eruption were favorably modified and cicatrices did not appear in the treated parts. The application is kept up throughout the entire period of the eruption, the coverings being kept continually moist.

Casas Abril ⁶³² _{p.376; June 9} ⁴¹ has reported the employment of carbolic acid in 44 cases of variola, with 3 deaths (in cases of haemorrhagic confluent variola). By the side of each patient was placed an open vessel containing carbolic acid, and the floors were sprinkled with a solution (1 to 100) of the acid. Diaphoretic drinks were given without restraint. At first a vegetable diet was

given, but during the period of desquamation nutritious broths and fowl were directed. Carbolic acid was administered internally, in doses of from 1 to 2 grammes ($15\frac{1}{2}$ to 31 grains) in the course of twenty-four hours, in sweetened water. Pills are to be avoided, as, when the stomach is empty, they may act with caustic effect. The utility of the method of treatment manifested itself in the reduction of temperature during the continuance of the administration; in diminution in the frequency, with increase in the strength, of the pulse; in limitation of the extent and duration of the exanthem and of the process of suppuration; in many cases of confluent variola the pustules underwent contraction and desiccation in the course of a few days; in advanced cases the exanthem was but little modified, but the pyrexia and the general condition were favorably influenced; complications were uncommon. As a rule, patients take the drug with readiness. To the face, local applications of a 1-to-1000 solution of mercuric chloride were made. Ocular and aural complications likewise responded to treatment with a 1.5-to-1000 sublimate solution.

(From the *ANNUAL* for 1894.)

Etiology.—Wiley, of Zumpango, Mexico, reports⁶, that variola is always present in that place, and epidemic every year from February to April. The natives consider it a disease of childhood, but it is said that in the epidemic of 1893 the mortality was 70 per cent. The natives are not revaccinated, and wear the blankets from the beds of variolous patients.

By inoculating various culture-media with a bit of a recent variolous nodule and from dry preparations, Besser⁵³⁰,²¹ was able to isolate bacilli 1μ long and $\frac{1}{2}\mu$ thick, with rounded extremities, and which he believes to bear an etiological relation to the primary disease. The characteristics of the organism are said to be its slow growth in the thermostat, its failure to grow at the temperature of the room, the viscosity of its cultures, and its arrangement in palisades.

Contagion.—Colclough, of Long Reach, Eng.,⁶ recites a series of cases that go to show that variola is little, if at all, contagious during the period of incubation and for a day or two after the eruption has appeared. The practical deduction is that the

most important steps to take in the stamping out of a threatened epidemic consist in the early recognition of the disease, the prompt isolation of cases, and the immediate vaccination or revaccination of all persons that have been exposed to infection and have not been successfully vaccinated within a period of two years. Coste, of Marseilles,⁹² _{Oct. 10, 1902} calls attention to an abortive form of variola, characterized by headache, backache, nausea, vomiting, and fever, lasting for several days and followed by apparent recovery. Careful examination at this time, however, may succeed in disclosing the presence, in some unusual situation, of a papule or a small number of papules, which may pass through the typical stages of vesicle and pustule, or may gradually disappear without other alteration.

Diagnosis.—Savill² _{Apr. 29} points out that the means upon which reliance may be placed in the diagnosis of variola before the appearance of the typical papular eruption include a suspicion that variola is or may be present in a given locality; the sudden advent of pyrexia in a previously healthy person; other constitutional symptoms; and the appearance of initial rashes.

Békésy, of Budapest,¹¹³⁰ _{1881, July} has made a careful study of the out-patient records of the Stephanie Children's Hospital, at Budapest, with a view of shedding some light upon the question of the identity or non-identity of variola and varicella. He found that varicella is always prevalent in Budapest, averaging about 33 per cent. of the total morbidity among children. Until the year 1888 individual cases of variola occurred annually, except during the four years in which the disease assumed epidemic proportions. No relation could be made out between the number of cases of variola and of varicella, and the time of their occurrence in any one year or in a series of years. Cases both of variola and of varicella may occur, independently of one another and of the age of the patients, in the first years of life in equal degree. Varicella attacks the vaccinated and the unvaccinated alike, while variola is relatively rare in the vaccinated. The evidence is thus against the identity of the two diseases.

Gornall, of Warrington, Eng.,⁶ _{Aug. 29} from a considerable experience, expresses the belief that the initial rashes of variola are comparatively rare. He divides them into four classes: (1) scarlatiniform, (2) morbilliform, (3) urticarial, and (4) petechial. Scarlatiniform eruptions are general in distribution, precede severe and

often rapidly-fatal attacks, and not uncommonly, though not invariably, are an early feature of purpura variolosa. Morbilliform rashes may be somewhat irregular in distribution, though their most characteristic situations are the face and the extensor surfaces of the limbs; they do not find their favorite positions in the groins and axillæ, as in the cases of the other initial eruptions. They occur only in discrete cases of a much modified character. Urticular rashes may appear upon the extensor surfaces of the forearms and legs, in front of the axillæ, and about the groins and the lower part of the abdomen. Petechial rashes appear to precede only cases of considerable severity, though not necessarily fatal.

Complications and Sequelæ.—Davezac and Delmas¹⁸⁸ have reported the case of an unvaccinated woman, 33 years old, who developed an attack of confluent variola consequent upon exposure to infection. As convalescence appeared about to set in, the patient was seized with a convulsion, attended with loss of consciousness, and followed by left hemiplegia, without impairment of sensibility. The palsy gradually subsided, but a pleuro-pneumonia developed upon the left side, requiring thoracentesis, which gave exit to about a pint of pus. The affected pleural cavity was treated with repeated irrigation, and manifested a tendency toward improvement. An hour after such an irrigation, however, the woman was again seized with a convulsion, and in a short time died. Upon post-mortem examination, in addition to the morbid condition of the left lung and left pleura, an area of softening was found in the right cerebral hemisphere, involving the upper and posterior portion of the ascending parietal convolution from the median fissure almost to the fissure of Sylvius, as well as the adjacent parts of the superior and inferior parietal lobules. In the midst of this area the third branch of the Sylvian artery could be seen. The opinion is expressed that the first convulsive seizure was dependent upon the formation of an infectious embolus, secondarily to which an encephalitis developed.

Mitra²³⁹ _{Apr. 16} reports 22 cases of articular disease observed at the Kashmir State Hospital in 1892 in the sequence of variola. The symptoms were characteristic of acute arthritis, suppuration taking place very rapidly, with partial or complete luxation. The elbow was the usual seat of inflammation. In several cases almost all of the large joints were affected. This acute infective arthritis is very

resistant to treatment. In the majority, free opening, drainage, and rest yielded satisfactory results. Excision was necessary in two elbow-cases and one knee-case, and in a little patient amputation of the arm had to be performed in order to avoid death from diffuse suppurative inflammation, extending from the elbow to the wrist, with gangrene spreading very rapidly. In excision of the elbow, a posterior straight incision was made, and anterior angular splints were used. All of these cases of joint-disease came under treatment at a late stage; consequently, ankylosis, even after free incision and drainage, could not be avoided in several cases.

Auché, of Bordeaux,¹⁴ has reported two cases of variola complicated by purulent peritonitis. One occurred in a girl of 19; the peritonitis was generalized, and developed during the period of suppuration of an attack of coherent variola. Two varieties of micro-organisms were found in the pus,—the streptococcus pyogenes and the staphylococcus pyogenes aureus. The internal and external genital organs and the other abdominal viscera were healthy, and, in the absence of any other focus of infection, it was concluded that the pyogenic micro-organisms were conveyed to the peritoneum through the intermediation of the blood-current. The second case was in a woman of 34, and terminated fatally. After death, which took place during the stage of desquamation of an attack of discrete variola, one of the ovaries was found suppurating, in conjunction with a purulent pelvic peritonitis. Only the streptococcus pyogenes was found in the pus. The vagina, the tubes, and the uterus appeared to be healthy.

Treatment.—Pepper, of Algiers,⁵ calls renewed attention to the utility of cocaine in the treatment of variola. In some instances the disease may be thus arrested; the disorganization of the blood is generally less rapid and less extensive; the fever is less severe and of shorter duration; the vesico-pustules and the pustules are frequently but incompletely evolved or partially aborted when cocaine has been regularly employed during the second stage of the disease; finally, the various visceral congestions and inflammations are less frequent and less intense. One drop of a 4-per-cent. solution may be administered in water, or otherwise, according to taste, four times in twenty-four hours for every year of age; thus, 5 drops to a child of 5, 10 drops to a child of 10, 20 drops to a person of 20, etc.

One-half of the dose given is frequently sufficient. The drug may be agreeably given in sweetened pastilles, each containing gr. $\frac{1}{4}$ (0.0025 grammes) of cocaine, with or without a small quantity of pepsin. Cocaine may also be given, at intervals of six or eight hours, in suppositories in doses corresponding to those given by the mouth. The hypodermatic administration is not recommended, except in the incipient stage, when the drug cannot be given by the mouth or the rectum. The dose should be one-fourth of that given by the mouth. Cases of variola display a marked tolerance to cocaine, but the effects of the drug should be carefully watched. This method of treatment does not exclude other therapeutic measures, either general or local; but in many cases in which cocaine is methodically administered no other treatment is required.

Auché, of Bordeaux,²⁵ has employed serum from the blood of convalescents from variola in the treatment of two cases of variola, with inconclusive results. He first assured himself that the donors of the serum were free from transmissible disease, and that the serum itself was sterile and innocuous. The first case was in a girl, 14 years old, who had never been vaccinated and had not previously had variola. Six cubic centimetres (1½ drachms) of serum were obtained from the blood of a man, 51 years old, who had had an attack of variola a month and a half before, and this quantity was injected into the subcutaneous tissues of the girl's thigh on the third day. The attack, which at first threatened to be of great intensity, afterward pursued a mild and abortive course, and soon came to an end and was not followed by pitting. The second case occurred in a boy, 16 years old, who had likewise not been vaccinated. In this case the disease was a little farther advanced than in the first when the injection was practiced. Two injections were made with the serum from a man, 24 years old, convalescent from an attack of discrete variola, the first of 8 cubic centimetres (2 drachms), the second of 10 cubic centimetres (2½ drachms). In this case no appreciable effect upon the course of the attack was observed. The patient recovered, with slight or no pitting. In neither instance was the injection attended with noteworthy pain or discomfort.

Eade²⁶ suggests the application to the body of an ointment of sulphur or carbolic acid in case of exposure to variola or during the period of incubation of the disease. After the eruption has

appeared and the papules have begun to soften, benefit will result from the introduction of bactericidal agents into the individual papules. In the decadent stage, when desquamation is taking place, simple antiseptic inunctions should prove useful.

Vaccination, Vaccinia, etc.—By treating calves and goats with considerable quantities (from 1 to 2 grammes—15 to 31 grains) of vaccine-lymph, diluted with distilled water, by intra-peritoneal injection, Siegel, of Berlin, ⁶⁹ _{Jan. 12} succeeded in isolating a coccus or short bacillus from 1 to 1.5 millimetres (!) long and a little less thick. The inoculated animals were killed after the lapse of from four to eight days, meanwhile having presented no appreciable morbid phenomena. In every instance the peritoneum, particularly the mesentery, was found covered with a fibrinous deposit, while all over the peritoneal surface were scattered a large number of miliary nodules, and the mesenteric glands were in a state of acute inflammation, in places presenting haemorrhages. Spleen and kidneys presented no abnormality. The liver was always enlarged, and there were some areas of fatty degeneration and some small areas of softening. Upon blood-serum, inoculated with fluid from the liver and the enlarged lymphatic glands and placed in a thermostat, colonies of a single kind of organism developed in the course of two or three days. The organism also grew upon gelatin, without causing liquefaction. It was best stained with Kühne's carbolized methylene blue, being simply cleared in water, without the use of alcohol. Marked pigmentary infiltration of the liver, spleen, and lymphatic glands was observed and considered noteworthy. Goats treated by intra-peritoneal injection of large quantities of cultures of the organism, and destroyed four days later, presented appearances similar to those found in the animals treated with vaccine-lymph. To determine if immunity could be conferred by means of these organisms, as with vaccine-lymph, eight adults that had not been vaccinated within twelve years and three children in the first year of life were inoculated upon the arm with the cultures. The operation was followed by redness and swelling for the first three days, with subsequent subsidence of the local manifestations and the formation of a slight cicatrix. After the lapse of fourteen days the same persons were all vaccinated in the customary way upon the inoculated arm with vaccine-lymph. Of the eight adults a typical pustule appeared in but one. In the children the vacci-

nation pursued a typical course. In explanation of these results it is pointed out that the organisms may have lost in virulence in the process of cultivation, and were thus not of sufficient activity to confer immunity upon the susceptible infant, while still active enough to confer immunity upon the more-resistant adult.

Hervieux, of Paris,³, studied the influence upon the foetus of revaccination of the mother. Of 152 cases in which the mothers were revaccinated during the last months of pregnancy, and in which the infants were vaccinated soon after birth, in only 46 did the vaccination of the children fail. Experimental observations seem to indicate, in a general way, that immunization of the mother is only exceptionally transmitted to the offspring.

Manning, of Birmingham, Eng.,⁴, reports two cases of variola that strikingly illustrate the prophylactic value of vaccination. The cases occurred in sister and brother, aged respectively 11 and 3½ years, who had contracted the disease from the same source and had been subjected to the same surroundings and influences, excepting that the elder had had an attack of scarlatina some months previously. The first child had been vaccinated in infancy, and presented four scars. The eruption consisted of a few papules on the face and forearms, which never developed into true vesicles. No symptoms followed the eruption. The second child had never been vaccinated. It presented a confluent eruption, and died nine days after coming under observation. The photograph was taken on the thirteenth day of the attack of the first child and the tenth of that of the second child.

In a series of investigations as to the best methods of preserving vaccine-lymph for use in remote parts of the world, where it is impossible to establish vaccine-depots, and where fresh lymph from the calf cannot be employed, Surgeon-Major King,², found that, by mixing fresh lymph in certain proportions with anhydrous lanolin, a preparation could be obtained which retained its efficiency in all seasons and climates for a period of from forty to sixty days. King also sought to determine if he could secure a more-active lymph by passing small-pox through the calf. By careful watching he found that vesicles appeared at points distinct from that of inoculation; from these he collected lymph and vaccinated a second calf, and so on to the seventh calf, when, finding that the lymph in these successive generations was in no respect

different from ordinary calf-lymph, he caused to be vaccinated two children with some lymph from the seventh calf, the results of which were to be reported. In order to insure a perfect source of vaccine-lymph, Chambon and Ménard¹⁰⁰ have found it advantageous to prepare, from the crusts obtained from a cow in which the eruption was a particularly typical one, a pulp with glycerin, which can be preserved for a number of weeks in a sterilized, sealed, glass tube.



SMALL-POX IN THE VACCINATED AND THE UNVACCINATED. (MANNING.)
London Lancet.

In this way it is believed that the ordinary pyogenic organisms die, while the activity of the virus remains unimpaired.

Wilson²²⁹ reports the employment of goat-lymph in vaccination. Of 150 men thus treated the result was successful in all but 11; on revaccination of these 11 there remained only 4 in which the operation failed. The same successful results were obtained in treating a number of other cases in the same way. Goat-lymph is believed to be superior to calf-lymph. It has the advantage of not being likely to transmit tuberculosis, as goats are rarely tuberculous.

Pohly, of New York,⁵⁹ describes an instrument that he has devised for facilitating the performance of vaccination. It consists of a handle of metal provided with five little sharp blades, fastened by a screw so that they can be extended or withdrawn to any desired length, and can be readily cleansed. It possesses the additional advantage that five incisions can be made with the same facility and in the same time as is required in the making of a single incision.

Complications of Vaccination.—Epstein⁸⁸⁶ reports 2 cases of purpura and 14 of erythema, developed in the course of 430 vaccinations. The cases of purpura occurred in children 12 and 4 months old, respectively, the hæmorrhagic spots being of varying size, appearing four days after vaccination, gradually disappearing in the course of a week, and being preceded by agitation, insomnia, and fever. In the first child, which was rachitic, the spots occupied exclusively the left superior extremity, especially its extensor surface; in the second case they were distributed upon the extremities and the trunk. In both the vaccination proved successful, the vesicles at no time, however, being hæmorrhagic. Five days after the attack of purpura measles developed in the first child, the eruption being quite distinct from the petechiæ. Of the 14 cases of erythema, the eruption appeared in 1 on the fourth day, in 1 on the fifth day, in 1 on the sixth day, in 5 on the seventh day, in 2 on the eighth day, in 3 on the ninth day, in 1 on the tenth day, and in 1 on the eleventh day after vaccination. The distribution of the eruption followed no particular course. Most often it appeared about the inflammatory areola of the vesicle, and at the same time upon the extensor surfaces of the arm and forearm; often it appeared upon the postero-external aspect of the thighs, upon the thorax, and upon the sacrum. The erythema resembled the exanthem of measles. It developed in the course of from twenty-four to seventy-two hours, and persisted ordinarily for from six to eight days.

Perl, of Berlin,⁴ relates the case of a child, 2½ years old, vaccinated for the first time. The child had been rachitic, slow in learning to talk, and had suffered a good deal with eczema, but at the time of the operation was in perfect health and well nourished. Four days later it became restless, complaining of pains in the abdomen and back and appearing feverish. On the

following day vesicles were visible at the site of vaccination. It was also noticed that the urine was scanty, turbid, brownish, and deposited a heavy sediment. On examination, its specific gravity was found to be 1016, and albumen in the proportion of $\frac{1}{2}$ per cent. was detected, together with blood coloring-matter. Microscopical examination disclosed the presence of red and colorless blood-corpuses and numerous hyaline, epithelial, and blood tube-casts. With rest in bed and a milk diet these manifestations disappeared in the course of a week and the child recovered perfectly. The vaccination in other respects pursued its usual course. Three other children that were vaccinated at the same time presented no abnormal manifestations. At a meeting of the Clinical Society of London, Colcott Fox² read notes of two cases of generalized vaccinia. In each instance the case was the only one thus affected of many vaccinated from the same source, and the primary vaccination ran a normal course; on about the ninth day, however, the vaccinated arm became covered with a dense aggregation of supplementary vesicles. These were quickly followed by others, disseminated singly or in twos and threes over the unbroken skin of the scalp, face, trunk (front and back), and limbs. Fresh lesions were evolved for two or three days, and then abortive pustular lesions until the twenty-fifth day in the first case, and until the eighteenth day in the second. Hardly any scarring resulted, and the mucous membranes escaped.

In a report on vaccination in Indo-China, Marchoux⁸⁷⁹ May 20, June 17 relates three cases of varioloid or varioliform eruption following vaccination with vaccine obtained at the Vaccine Institution at Saïgon, where buffaloes are used as vaccinifers. This vaccine is known to possess exalted virulence. In the first case, in a child, about fifty umbilicated pocks developed upon various parts of the body simultaneously with the development of the vaccine-pocks. The child had some backache and a little fever. The second case, also in a child, presented twelve umbilicated pustules, which likewise developed at the same time and rate as the vaccine-pocks. The fever was considerable. In the third case, in an adult, numerous other spots appeared at the same time as the vaccinal pustules, ultimately about one hundred pustules being scattered over the body. There was considerable fever; the patient was delirious and confined to bed. In all of the cases inquiry failed to

elicit any evidence that the patients could have been exposed to variolous infection.

Millard¹⁴, reported the case of a woman in whom, in the sequence of a revaccination, both vaccinia and variola developed, although she firmly declared that she had not had any relations with a variolous patient.

In a study of the interrelation of variola and vaccinia Cope-man²², satisfied himself that inoculation with the virus of either small-pox, calf-lymph, or human lymph was equally protective against subsequent inoculations with any of the other, and also that local manifestations were not essential to the general constitutional effect. This conclusion was confirmed by the immunity occasionally observed in calves after apparently negative or unsuccessful attempts at variolation; in infants whose mothers had been attacked by small-pox in the latter months of pregnancy; and by experimental vaccination with lymph that had been subjected to a heat sufficient to destroy all extraneous microbes and to render plate-cultures with it invariably sterile. The result in these last cases suggested the presence of an antitoxin rather than of a living organism as the immediate cause, and that this might be contained in the blood-serum of animals rendered immune.

The ultimate etiology of variola yet awaits elucidation. Despite numerous researches, the discovery of the micro-organism that is probably the exciting cause of the disease has not been definitely made. Nevertheless, work is being pushed in the direction of a biological mode of treatment,—that is, the employment of the blood-serum of convalescents from variola, in the hope of antagonizing the intoxication of the disease with the antitoxin presumably present in the blood of those that have recovered. This work will be greatly facilitated by the discovery of a specific organism which may make possible the preparation of an active antitoxin by the treatment of animals with virulent cultures. The importance of vaccination cannot, however, be overshadowed by the discovery of a microbe of variola or the preparation of a specific antitoxin. To possess this last will mean to be doubly armed. The prevention of disease, and particularly of contagious disease such as variola, is even *more* urgent than cure. As, however, the immunity conferred by vaccination is but temporary and relative, and as, also, there will probably always be persons who,

from ignorance, prejudice, or neglect, will resist vaccination, the benefits that will accrue from the possession of a remedy for variola are obvious and the acquisition of such an agent is an end cordially to be desired.

That vaccination may be attended with unpleasant, not to say disastrous, results has from time to time been observed. Thus, the local inflammation may be intense and extensive and the constitutional disturbance profound, even in the absence of complications that may arise from the use of contaminated lymph or the employment of imperfect and septic methods of inoculation, or apart from other secondary infection. Occasionally death has followed vaccination, apparently as a direct result. The lesson to be derived from these facts is the exercise of the greatest care in the selection of vaccine-lymph and the observance of the strictest surgical asepsis in the operation, together with watchfulness and intelligent after-treatment of the vaccinia.

It seems scarcely necessary to make extended reference to the distinction between variola and varicella, so divergent are the two affections in symptomatology, course, duration, and results. Besides, neither gives rise to nor protects from the other, while either may follow the other.

RELAPSING FEVER.

(From the ANNUAL for 1890.)

Peter¹⁵², lectured on what he terms relapsing fever in a number of Annamites, visitors to the Paris Exposition. No mention is made of examination of the blood, though the discovery of Obermeier is alluded to in the comments. It is difficult to determine from the report just what relationship Peter desires to establish between these cases, his "fever of fatigue," the "famine fever" (typhus?) of Ireland, and "yellow fever." At all events, he treated his cases with rest and nourishment. Fever ceased in about three days, but he expected a return. Icterus was present in all cases.

(From the ANNUAL for 1891.)

Pasternacki⁵⁸⁶ has arrived at the following conclusions as to the fate of the spirochetæ in the blood of patients with relapsing fever: The spirochetæ retain their form and activity at a temperature of 80° C. (176° F.), if not exposed longer than half a minute. An exposure of thirty minutes will kill them at 45° C. (113° F.). The movements cease and the organisms disappear from view. The fine and active granules found in the blood, in cases of relapsing fever, during the first stage resist not only the greatest hyperpyrexia, but also degrees of heat more than sufficient to coagulate the blood. In contrast to the spirochetæ, these granules appear to increase in number and activity with high temperatures. When granules and spirochetæ are simultaneously present in the blood in an occluded capillary, the simple granule outlives the complex spirochetæ. The motile granular bodies, arranged in from four to tens, in chaplets or in rosettes, are not present in the blood in the early stage of relapsing fever, at the period of growth and development of the spirochetæ. They occur in large numbers when a closed tube containing blood from a case of relapsing fever is heated suddenly to a high degree or continuously to a lower degree. At the same time, the spirochetæ disappear. This suggests that the spirochetæ are transformed by the heat into the

granular bodies. Although the gradual inhibition of their movements and the ultimate disappearance of the spirochetæ on the approach of the crisis are obscure phenomena, perhaps dependent upon several causes, it is not impossible that the facts established by the investigations of Heidenreich and of Pasternacki, as to the disturbing influence of high temperature upon the activity of these parasites, may have some bearing upon their disappearance from the blood in the hyperpyrexia of the critical stage.

The investigations of Ssacharow ⁵⁸⁶_{No.1, '99} have led him to the following conclusions: Throughout the course of relapsing fever an haematozoön, in some phase of development, is present in the blood. The disease may be diagnosticated, even in the apyretic period, by means of stained preparations of the blood. The morphological resemblance between the parasites of malaria and relapsing fever renders it probable that the latter, like the former, is miasmatic in origin. This resemblance also accounts for the parallelism of the symptoms of the two diseases. The spirochetæ of relapsing fever are not schizomycetes, but pseudospirilla.

(From the ANNUAL for 1892.)

Neal ²³⁵_{Dec. '90} has recorded 6 cases of relapsing fever of 10 under observation. The most constant symptoms were nausea and bilious vomiting, jaundice, pains in the muscles and joints. The duration of the first febrile period was from three to five days; of the first intermission, from five to ten days; of the second febrile period, from three to five days; of the second intermission, when a third paroxysm occurred, one day. The third paroxysm lasted scarcely longer than a day.

(From the ANNUAL for 1894.)

Ouskow ¹¹⁰¹_{v.2, No.1} has reported the results of observations made in two epidemics of relapsing fever at St. Petersburg, the one in 1885-86, the other in 1890-91: the first comprised 794 cases, the other 1874,—a total of 2668. The mortality of the first epidemic was about 4 per cent., that of the second about 6 per cent.; the mortality was higher in females than in males, in the proportion of 8 to 5 for the first epidemic and of 7 to 5 for the second. In both epidemics, and especially in the second, it was the lower classes that were first affected,—the poor, the worthless, the homeless,

the occupationless,—and of these as many males as females. The diagnosis was based upon the presence in the blood of the spirocheta of Obermeier. In both epidemics death occurred especially during the first stage, and principally at the end of the first paroxysm, more rarely after the second, and very rarely after the third. After death hyperplasia of the spleen, with multiple infarction, was the lesion most commonly found. The appearance of infarcts afforded an indication of the number of paroxysms and the period of the disease. In some cases softening of the infarct occurred, with inflammation and adhesion to adjacent structures, such as the diaphragm, with the development of pleuritis. In two cases rupture of the spleen took place, followed by peritonitis. In the liver, as in the spleen, dilatation of the vessels was a common feature. In most cases an increase in the number of colorless blood-corpuses of variable degree took place during the paroxysm. After the crisis, and oftener a short time in advance of the crisis, the number of colorless corpuscles underwent a sudden diminution. The increase involved especially the polynuclear elements. The most characteristic phenomenon was the reversal of the proportion between the number of small lymphocytes and that of the large mononuclear elements; both were present in almost equal number, the small lymphocytes sometimes even in the larger number. After the crisis there was not only a diminution in the total number of colorless cells, but a change in the proportion of the different varieties. The polynuclear elements fell to about 60 per cent. of the total; while the number of small lymphocytes exceeded (sometimes fifteen times) the number of large mononuclear elements. The increase in the number of large mononuclear elements may be ascribed to the changes induced in the spleen (in which organ, probably, the small lymphocytes are transformed into large mononuclear elements, passing thence into the blood). The increase in the number of the small lymphocytes may be explained by the changes that take place in the lymphatic glandular apparatus.

WEIL'S DISEASE (FEBRILE ICTERUS).

(From the ANNUAL for 1889.)

Although, since the original description by Weil, in 1885, of the complex of symptoms constituting the obscure disorder known by his name, a considerable number of cases have been contributed to the literature of the subject, but little new light has been shed upon the intimate pathology and etiology of the affection. That its predominant symptoms and most striking lesions are due to parenchymatous inflammation of liver and kidneys post-mortem investigation has amply demonstrated, and that the morbid changes are the results of an infectious process would by analogy seem a justifiable inference.

Fiedler ³²⁶_{v.42,p.281, May} ⁵ concludes that Weil's disease, of which thirty cases have been so far reported, is not an abortive form of typhoid fever, as Weil has suggested. It is a distinct, acute, infectious, or toxic affection. The disease begins suddenly, without prodromal symptoms, but often with a chill. The constant symptoms are fever, headache, gastric disturbance, jaundice, and muscular pain, especially in the calves. The fever has a typical course, and lasts eight or ten days. Relapses have been observed. The spleen and liver are generally, but not always, swollen; the liver often becomes tender on pressure. Nephritis is often observed; herpes and erythema occur at times. The prognosis is generally favorable. Weil's disease is generally seen in hot weather, and men in the prime of life are the most subject to it. The cause is quite unknown, but butchers appear most liable to the disease, judging from the scanty statistics already at the disposal of the physicians who have studied Weil's disease.

(From the ANNUAL for 1890.)

Fraenkel ⁶⁹_{Feb. 28} critically reviews the published accounts of cases of so-called Weil's disease, and reports a case due to an infected wound. The patient, a medical student 22 years of age, was cut upon the forehead while fencing, the right temple being also excoriated. The wound was antiseptically dressed and bandaged,

but the temporal excoriation was not protected. On his way home the patient wore a hat which had been kept in the dissecting-room. The wound healed nicely, and for two days there was no indication of trouble. Then occurred a chill, followed by high fever, with sleeplessness and delirium. In the course of thirty-six hours there was observed, surrounding the excoriated spot, an erysipelatous blush, which disappeared after forty-eight hours. Fever and delirium persisted. Restlessness gave way to somnolence and great prostration. Diarrhoea ensued. Icterus of a pronounced type was noted five days after the accident, the urine showing bile-pigment and considerable albumen. Liver and spleen were somewhat enlarged, the liver very sensitive to pressure. On the night between the eighth and ninth days of the disease the fever ceased by crisis and the jaundice and albuminuria disappeared coincidentally. The patient failed to gain strength, and a new febrile period began about eleven days later, lasting five or six days. Convalescence was prolonged. The author discusses the subject elaborately, and concludes that the symptom complex described by Weil cannot be regarded as a specific disease on etiological, semeiological, or anatomical grounds. It may result from various causes. "Infectious or septic icterus" is the name he proposes instead of "Weil's disease." Baginsky related a case in a child of 1½ years. The autopsy showed normal brain; œdematosus lungs, with slight atelectasis; normal heart-valves; large liver, moderately icterotic; large, soft spleen; pancreas large and pale; large kidneys, the cortices broadened; gastric mucous membrane swollen; gall-bladder moderately filled and patulous; swelling of solitary follicles and Peyer's patches; no ulcers in the intestines. Microscopic examination showed normal liver-cells, but parenchymatous degeneration of the kidneys.

Goldschmidt³⁴ considers at length the present evidence concerning Weil's disease. He reviews the cases of Weil, Merkel, Aufrecht, Wagner, Roth, Matthieu, Fiedler, Haas, Pfuhl, Hueber, Nauwerck, Brodowski and Dunin, and Fraenkel. He describes 4 cases of his own. The ages of his patients ranged from 22 to 24 years. They were all males. All recovered. In general terms, the phenomena presented were those of an acute febrile process, with severe nervous symptoms, enlargement of the liver and spleen, and albuminuria. The fever was of a remittent type, in

some cases intermittent, with relapse after periods varying from a few days to a week or longer.

F. Vierordt ⁵⁷ records at length a case of febrile jaundice (Weil's disease) observed in 1881. Lemoine ²⁶ questions whether there is really a morbid entity manifested by the assemblage of symptoms described by Weil and belonging to the typhoid type. Other articles upon the subject are those by Rendu, ⁸⁵ Miller, ² Le Flaine, ¹⁰⁰ Goldenhorn, ⁴ Benech, ²¹³ Stirl, ⁶⁹ Perret, ²¹¹ Barie, ³⁵ Brodowski and Dunin, ³²⁶ Winnischeid, ³²⁶ Chéron, ¹⁷ and Weiss. While there are many who contend that Weil's disease is a distinct affection which might properly be called "essential febrile jaundice," the weight of opinion inclines to the view that a number of infectious processes of various origin, but similar in their symptomatology, have erroneously been included under one name, and that Weil's disease is not a nosological entity. As of interest in this connection it may be mentioned that Jennings ¹⁸⁵ exhibited the gall-bladder and duct, with impacted calculi, of a man who died from acute obstructive jaundice, the case having been characterized by an intermittent fever of irregular type, and probably belonging to the class of cases described by Charcot as "intermittent hepatic fever." There had been no suppuration.

(From the ANNUAL for 1891.)

Werther ⁶⁹ presents an analysis of 71 cases of Weil's disease collected from the literature on the subject. In cases under observation from the first day, the maximum temperature occurred on the first or second day. The temperature was high also on the third and fourth days. The ascent was rapid. The fastigium lasted one day. A notable remission took place during the night, between the fourth and sixth days. Subsequent defervescence was by lysis. In addition to headache and vertigo there were mental dullness, feeling of malaise, marked debility, and, sometimes, somnolence. At night there were fear and restlessness. Muscular pains, especially in the thighs, and hyperesthesia were usually present. There were excessive thirst and disgust for food. The pulse was, at first, frequent, often small, not rarely dicrotic. The frequency of respiratory movement was marked, the lungs being healthy. Nausea and vomiting were present, usually at the

beginning of the attack. Diarrhoea was more common than constipation, the stools not always being clay-colored. The spleen was enlarged in many cases, the liver in a smaller number, with or followed by jaundice of variable duration and intensity. The excretion of urine was diminished, with albuminuria in many cases, and in a small number with casts. Edema never occurred. The function of the kidneys was always resumed. In the cases in which the amount of urea excreted was measured, the lowest point was reached at the height of the fever. Herpes and exanthemata were not rare. The tendency to haemorrhages, epistaxis, haemoptysis, haematemesis, bloody stools, purpura are indications of the general infection. Among the complications were parotiditis, a peculiar variety of "biliary" pneumonia, iridocyclitis, and pareses. But little is known of the pathological anatomy of the disease. The liver-cells are degenerated, the interstitial tissue inflamed. The disease occurs sporadically or in limited epidemics, especially during the summer months. It is more common in males than in females, young adults especially suffering. Soldiers and butchers seem especially predisposed to the disease. The active agent is thought to be a product of the decomposition of organic matter, which gains entrance into the system through the gastro-intestinal tract. Mazzotti⁵⁷ has reported 15 cases of Weil's disease under his own observation. Ten recovered; 5 died. In the latter, he found granular and fatty degeneration of the liver-cells, with evidences of interstitial hepatitis, without catarrh of the gall-ducts and without obstruction to the flow of bile; degeneration of the renal epithelium, with indications of interstitial nephritis. In 2 cases there was swelling of the salivary glands. Acute onset, fever, jaundice, swelling of liver and spleen, nephritis, nervous symptoms, brief duration, favorable outcome, relapse, tardy convalescence constitute the clinical picture.

From post-mortem examination of 3 fatal cases of Weil's disease, Sumbera⁵⁸ concludes that there exists, in certain portions of Europe, an acute infectious disease, sometimes sporadic, sometimes epidemic, presenting well-marked nervous manifestations, enlargement of the spleen and of the liver, derangement of the functions of the kidney, and manifested clinically by jaundice, muscular pains, and albuminuria. The disease is more common in males than in females, and relatively so in young adults. It

occurs especially in the summer months, and in the majority of cases terminates, at the end of from seven to eleven days, in recovery. In fatal cases, acute inflammation of kidneys, liver, and lungs is found.

(From the ANNUAL for 1892.)

Chéron ¹⁰⁰_{Feb. 14} comes to the conclusion that Weil's disease depends upon an intoxication of intestinal origin, or upon the absorption of ptomaines developed outside of the body and accidentally introduced through the medium of food or drink. The treatment is purely symptomatic. At the onset it is well to give a purgative, or, better, an emetic. A milk diet is advisable. Tonic doses of quinine may be given. Leiblinger ⁸⁴_{May 16, 22} adduces a number of facts in support of the view that the complex of symptoms known as Weil's disease does not constitute a disease *sui generis*, but is only the result of a resorption-icterus secondary to acute articular rheumatism. Both Weil's disease and acute articular rheumatism are specific, non-contagious diseases. Both occur most commonly between the fifteenth and thirtieth years of age. Jaundice has been noted in a not inconsiderable number of cases of acute rheumatism. Arthralgia and myalgia are common to rheumatism and Weil's disease, as are also articular crepitation and oedema of the extremities. The absence of sweating in Weil's disease is attributed to the existence of jaundice, and this in turn is thought to be dependent upon a catarrhal condition of the biliary passages, as part of a general inflammation of the mucous membranes. Renal disease and albuminuria and enlargement of the spleen attend both Weil's disease and acute articular rheumatism.

(From the ANNUAL for 1893.)

Sievers ⁴⁹⁸_{Dec., '91} ⁹⁹⁶_{Mar. '95} relates that, as early as 1878, Runeberg, of Helsingfors, described as *febris remittens cum ictero* the complex of symptoms detailed later by Weil and, after him, called Weil's disease. In thirteen years 14 cases had come under observation; most of them were in persons between 20 and 30 years old; 7 in males and 7 in females; cases were more numerous between September and December. In none of the cases was the etiology clear. The affection is considered a distinct one, probably of infectious origin.



Fig.5.

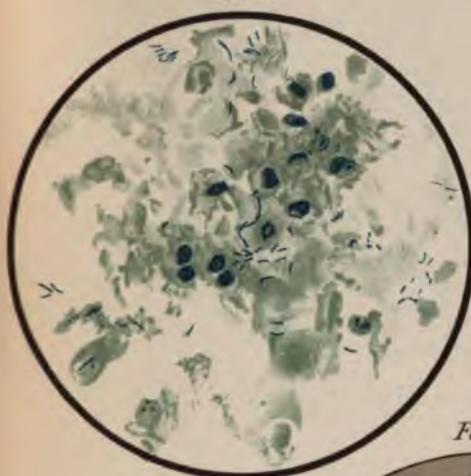


Fig.10.



Fig.11.

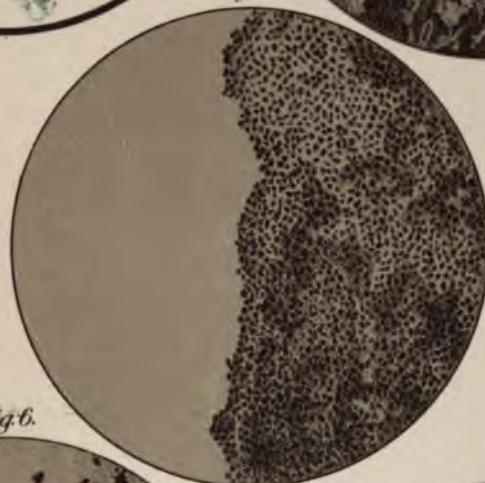
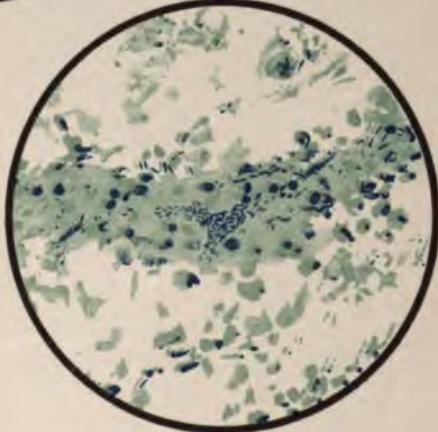


Fig.6.



Fig.9.



Febrile Icterus -Weil's Disease (Jaeger).

Zeitschrift für Hygiene.

or septicæmia (dependent upon staphylococci or streptococci). 3. It bears a closer relation to acute yellow atrophy of the liver and yellow fever; etiological investigation must determine whether or not it is identical with the one or the other of these. 4. The cause of the disease resides in bacteria belonging to the pleomorphous proteus group. 5. A specific pathogenic variety of proteus is not to be demonstrated; perhaps it may be that all forms of proteus can be viewed as in some degree pathogenic. 6. The pathogenicity of the different varieties of proteus varies greatly with the surrounding conditions. 7. Among the factors that increase the virulence of proteus bacteria are repeated passage through the animal organism, high temperature, the presence of a large amount of nitrogenous matter in the culture-medium, and possibly the presence of certain other bacteria. 8. Under the favorable conditions named the proteus may assume pathogenic activity in a restricted sense,—*i.e.*, it may gain entrance into the blood and tissues of the body and undergo multiplication. 9. All putrid nitrogenous substances, meat, fish, befouled water, may cause not only intestinal derangement, but also profound septic infection. 10. Of the cases included in this report the majority must be attributed to bathing in contaminated water. 11. The contamination was secondary to an epidemic of disease among fowl. 12. The cause of this disease is also a variety of proteus that is not to be distinguished from that found in cases of Weil's disease. 13. The organism was demonstrable in the water of an adjacent and tributary stream. 14. Its presence sufficiently explains the relation between bathing and infection. 15. Contamination of flowing streams with soiled and infectious discharges should not be permitted. Cultures of the bacillus proteus fluorescens are shown in the annexed plates in the following order: Figs. 1, 2, and 4, gelatin plate-cultures (Fig. 1 showing early and Fig. 2 late appearances); Figs. 3 and 8, gelatin stab-cultures; Fig. 7, non-liquefying stab-culture; Figs. 5 and 9, smear-preparations from urine (Zeiss $\frac{1}{2}$, Oc. 4); Fig. 6, smear-preparation from pure culture (Zeiss $\frac{1}{2}$, Oc. 4); Figs. 10 and 11, klatsch preparations.

THERMIC FEVER (INSOLATION).

(From the *ANNALS* for 1889.)

F. A. Packard,⁵ reports 31 cases of heat-fever treated at the Pennsylvania Hospital during the summer of 1887. In all cases the temperature was taken in the rectum. Usually at the outset from fifteen to twenty minimis (1 to 1.3 grammes) of digitalis were administered hypodermically, and the thermometer removed every seven minutes in order to note the change in the temperature. Patients were rubbed with ice and sprayed with ice-water constantly. If the icing were continued after the rectal temperature had fallen below 104° F. (40° C.) the decline was apt to be too rapid and too great. When convulsions were present after the temperature had been lowered a considerable extent, morphine was used, usually with good effect. In these cases respiration and pulsation both improved in character with fall of temperature, but if they did not do so bleeding was employed in spite of feeble pulse, as it was almost invariably followed by a quiet and full respiration, with a full and steady pulse. Whenever there was evidence of obstructed venous circulation in the brain, bleeding was employed. After the withdrawal of blood from the median basilic vein to the extent of from 12 to 16 ounces (373 to 498 grammes), there was usually a marked improvement in circulation, respiration, and color, and in many cases complete or partial return of consciousness. All of the cases were in whites, 15 were natives of Ireland, 5 of Germany, 3 of the United States, 2 of Scotland, 2 of England, and 1 each of Newfoundland, Switzerland, and Hungary. Fifteen were laborers.

In regard to the alcoholic habit predisposing to this condition, accuracy was impossible. The greatest number of cases were admitted between noon and 6 P.M. In nineteen of the cases the heat predisposing to the attack was solar, in eleven it was artificial, while in two both factors were at work. The highest temperature attained was 112° F. (44.4° C.), more of the cases having temperatures, upon reception, between 110° and 111° F. (43.3° to 43.9° C.) than between any other two degrees. Twenty of the cases were unconscious, eight were conscious, and three were partially conscious,

while four were wildly delirious. Consciousness was maintained in every case where the temperature was below 108° F. (42.2° C.), except in one where the temperature was 102.4° F. (39° C.). The pupils in twenty-four cases were extremely contracted, in five they were natural, in one they were sluggish, while in one only they were dilated. Where the pupils were contracted there was also present unconsciousness except in three cases, and in these the temperature was one hundred and six degrees or over. Convulsions occurred in but six cases. The pulse varied much in different cases, being invariably absent at the wrist, where the temperature reached 108° F. (42.2° C.). Respiration in almost all cases was accelerated. Color of the face varied from flushed in the lighter cases, to livid and mottled in the cases with marked alteration in respiration and circulation. Involuntary evacuation of liquid, offensive stools was present in many of the cases, with the typical mousy, repulsive odor characteristic of these discharges. The longest time required to reduce temperature to within safe limits was within one hour, the average time being from ten to fifteen minutes. The prognosis could be made easily from the facility with which the temperature was reduced. The mortality in the whole series was twelve out of thirty-one. The manner of death was, as a rule, by almost simultaneous cardiac and respiratory failure. Death might be stated to have been in most cases produced by the combination of the following causes: cerebral congestion, uræmia, marked alteration of the blood interfering with the due performance of its physiological functions, venous stagnation, respiratory and cardiac failure; the prime cause, of course, being excessive amount of body heat, the others depending partly upon it and partly upon each other, forming to a certain extent a vicious circle. The blood, probably, was first altered in composition, causing impaired nutritive capacity with a tendency to stagnation from its viscosity. The renal cavities became blocked up by the altered blood, thus cutting off the excretion of urea and its allies, which must have been formed in enormous quantity over and above that of health, from the rapid metamorphosis of tissue which it is reasonable to expect was occurring under the influence of the high temperature. Venous stagnation and vitiated blood, together with the changes in the cerebral tissue incident to the high temperature, produced the unconsciousness with the impairment of activity in the respiratory tract, while the

latter, with venous stagnation and cardiac weakness, caused interference with the respiratory function. Interference with the respiratory function again reacted upon both cerebrum and the heart. So, also, the heart, organically affected by the high temperature and functionally by the changes in other organs, kept the vicious circle revolving. Secretion of the skin was absent and the intestinal tract was greatly disturbed.

From the experience in the Pennsylvania Hospital, the essential points in the treatment of heat-stroke may be summarized as follows: Put patient in the shade where there can be as free a circulation of air as possible; strip him, and, if the temperature is above 106° F. (41.1° C.), apply ice to the body until temperature falls to 104° F. (40° C.), then dry patient and put him to bed with an ice-cap to his head. If convulsions occur at this time, use morphia; if the circulation and respiration do not improve with the fall in temperature, bleeding may be employed. In addition to these practical and easily remembered rules for the treatment of heat fever, we would remind our readers of a suggestion made by Morris J. Lewis,¹⁹ that the physician would do well to carry with him a watery solution of antipyrin, two drachms to half an ounce (7.8 to 15.5 grammes), and administer at once twenty drops hypodermically, in order to bring about an early fall in temperature before other means can well be effective. From the experience of several physicians²⁰ it must be remarked that for the treatment of insolation (thermic fever) every ambulance should carry ice, sprinkler, and pail, and the patient should be treated on the spot until the ambulance surgeon feels it is safe to move him. It is essential to have patient's clothing removed, and it is best to take thermometric observations with the thermometer in the rectum. Wherever the cardiac action is depressed it is of the utmost importance to keep patient in a recumbent position. If the patient has a very high temperature, it is unwise to too rapidly reduce it. The thermometer in the rectum is the best for all treatment. The influence of a full dose of antipyrin in the reduction of excessive temperature in case of thermic fever is a very important item to know. Under no circumstances has its administration been attended with uncanny results. In every case it has seemed to play an important part in the primary reduction of temperature.

(From the ANNUAL for 1890.)

Hodgdon ¹⁰⁴_{Dec. 15, '92} has reported a case of insolation in a child of 4 years, treated by cold bathing and aconite, with recovery.

Hume ⁶_{Apr. 20} has reported a case of dyspnœa and depression of the heart's action, which he attributes to vagus-inhibition, the result of heat-stimulation. The patient was an officer who had been marching all day in a hot Indian sun, the direction of the march being such that during the afternoon the left side of his head and neck were exposed. Three grains (20 centigrammes) of ipecac were given, with the result of relieving the symptoms and putting the patient to sleep.

Breitung ⁴¹_{June 10} has studied the pathology and therapy of sun-stroke and heat-stroke.

Prat ¹⁹⁵_{Dec. '92} has reported what he calls a case of "electric sun-stroke." The patient had been engaged some twenty minutes in adjusting the screw which separates the carbon points of an arc-lamp, his face being held some 40 or 50 centimetres (15 to 20 inches) or more from the arc, and had neither covered his eyes with smoked glasses nor taken any precaution against radiation. The current was one of from 12 to 14 ampères, with a potential of 44 volts, and the lamp had an illuminating power of about 200 Carcel burners. Two hours and a half later the man supped with good appetite, and three hours after this went to bed and slept soundly, as usual. About midnight he was awakened by feelings of insupportable pain and burning in the face, and especially the eyes. He was unable to see, covered his eyes, and complained of great scorching, which was aggravated by the least access of light. The lids and conjunctivæ were red and swollen, with muco-purulent discharge. With pain he distinguished between light and darkness, but could not distinguish objects. The entire face was reddened, especially around the eyes. Recovery took place under the following treatment: Belladonna ointment around the eyes and to the lids; cold compresses to the eyes; occlusion; hot foot-baths; saline washes, with, later, the addition of Van Swieten's solution.

(From the *Annual for 1892*.)

Martin² makes three types of thermic fever: 1. A cerebro-spinal type, characterized by the symptoms of intense congestion; by injection of the face and conjunctiva; by stertor, coma, and convulsions. 2. A cardiac, or syncopal, type, manifested by pallor of the face and by profuse sweats, death taking place by arrest of the heart. 3. A pulmonary form, in which, in addition to some of the symptoms noted, there are anxiety, dyspnoea, and asphyxia. As thermic fever usually arises under conditions of mental or physical overactivity, in conjunction with undue exposure to heat and a suppression of the secretions, the disease is held to be dependent upon the retention in the system of toxic products of retrograde metamorphosis. Based upon this view, a rational mode of treatment suggests itself. During the heated term extraordinary exertion is to be avoided, especially when the exertion is associated with direct exposure to heat. The secretions should be actively maintained. Asphyxia is to be antagonized by subcutaneous injections of ether—from 15 to 30 minims (0.81 to 1.75 grammes) every hour—and by artificial respiration. In the congestive type of disease, cold affusions should be made to the face and head, and rubefaction of the extremities induced. Subsequently, to prevent the recurrence of congestion and asphyxia, to re-establish the functions of the natural emunctories, and to favor the elimination of noxious matters subcutaneous injections of cocaine,—from 2 to 4 grains (0.13 to 0.26 gramme),—with or without ether, should be given three or four times in twenty-four hours.

Illoway³ has reported 3 cases of thermic fever in infants, each about 1 year old. The cases developed during the heated term, amid the most unfavorable surroundings. Each presented vomiting, diarrhoea, high temperature, and symptoms of profound depression. The cold wet-pack was used in treatment, with most successful results. Dercum¹¹² records the cases of two laborers, 31 and 27 years old, respectively, without a history of alcoholism or of syphilis, who, in the sequence of an attack of thermic fever, presented impairment of motility and sensibility, with wasting, fibrillar contractions, purring thrill, electrical changes, and diminished reflexes. In both cases decided improvement followed applications of the actual cautery.

Barlow⁵³, *June 6*, describes the sequelæ observed in a number of cases of insolation, many of which were in soldiers. In most of the cases both pulse and respiration were accelerated. Many presented indigestion, impaired nutrition, and anæmia. The majority complained of headache and vertigo. Perhaps the most constant feature was tenderness of the spine. The reflexes were, as a rule, exaggerated: In 4 cases, epilepsy appeared after the insolation; in 2, partial hemiplegia; in 9, cutaneous anæsthesia; in 3, hyperæsthesia. The mental faculties were impaired. In the majority, memory was enfeebled. One case presented marked muscular tremors; in 27 there was deafness. Twenty-six presented impairment of vision. Sighing respiration was a not infrequent manifestation. In 14 cases the heart was irritable; in each of 15 a cardiac murmur was heard. In many of the cases the murmur was dependent upon the anæmia; in some it was organic. In some cases the heart was irregular or intermittent.

(From the ANNUAL for 1893.)

Coplin, Bevan, and Sommer, ⁹ *Sept. 12*, of Philadelphia, report the results of observations made upon men working in a sugar-refinery during an unusually hot period. About 800 men were on duty by day and 500 by night. The temperature in different parts of the refinery varied from 95° to 165° F. (35° to 73.9° C.). Some of the men worked constantly in temperatures of from 115° to 118° F. (46.1° to 47.8° C.). The work, while laborious, was so arranged that continuous employment in very hot places was not required. During eight days 213 men were affected in varying degree: 183 of these were soon able to return to work after a little attention; 28 were sent to their homes, 2 to a hospital; 1 died. In the fatal case the temperature reached 110° F. (43.3° C.); in a case that recovered the temperature reached 108.8° F. (43° C.); in 7 cases it rose above 107° F. (41.7° C.); in 11 cases above 106° F. (41.1° C.); in 10 between 105° and 106° F. (40.6° and 41.1° C.); in the remainder the temperature reached lower levels. The great majority of the cases occurred in the boiler-room and in another room in which the raw sugar was emptied into a melting-reservoir, in two apartments of which the

humidity was relatively high. It became perfectly clear that a higher degree of heat could be borne if the atmosphere were dry than if the atmosphere were moist. There was no evidence that those men who drank beer suffered in greater number or greater degree than those who abstained. Those who drank largely of water appeared extremely prone to suffer. The most common and the most distressing symptom was "cramp," usually referred to the epigastrium, and which was not infrequently associated with a similar sensation in the calves of the legs, occasionally in the back, sometimes also in the hypogastrium, less commonly in the thighs and in the upper extremities. There was also complaint of difficulty in respiration, as if from a weight upon the chest. Occasionally there was pain in the splenic and hepatic regions. Headache was present in almost all of the cases. In some cases there was nausea; vomiting rarely occurred. Only exceptionally was the surface temperature high. The axillary temperature could not be depended upon: in the one fatal case the axillary temperature was 105° F. (40.6° C.), at a time when the rectal temperature was 108° F. (42.2° C.). In a few cases diarrhoea was present; in the majority the attack was preceded by constipation. Consciousness was, as a rule, preserved until the temperature reached 106° F. (41.1° C.). Delirium and convulsions sometimes preceded loss of consciousness. In many cases the pulse was irregular and gaseous and the rhythm of the heart was disturbed. The urine was scanty and high-colored, and when the pyrexia became excessive transient albuminuria appeared in some cases. Pain in the back was almost invariably present, and a few cases presented girdle-pains. Patients were not, as a rule, cognizant of their temperature; many felt cold when removed from the heat. The guiding principle in treatment was to increase the peripheral circulation.

In all cases the routine treatment that was employed is summed up as follows. After having been removed to a room specially provided for the emergency, the temperature was taken and the patient was placed in a low bath-tub, of which the water was of the same temperature as the body; he was then rubbed with large, gritty sponges until redness of the skin was induced; this was followed by a spray of water of a temperature of 45° F. (7.3° C.). After five or ten minutes the patient was removed from

the bath and again rubbed with sponges. If the temperature was not reduced to 100° F. (37.8° C.) the bath was repeated.

Meanwhile the man had been given by the stomach or beneath the skin $\frac{1}{60}$ grain (0.003 grammie) of strychnine, $\frac{1}{40}$ grain (0.0015 grammie) of atropine, $\frac{1}{8}$ grain (0.01 grammie) of morphine, and 20 drops of tincture of digitalis, followed by a teaspoonful of aromatic spirit of ammonia in a glass of milk. Nausea was best combated with cracked ice. Amyl nitrite was employed in but one case, with most gratifying results, the dose given being 3 minims (0.18 grammie), and it is thought that nitro-glycerin might be advantageously employed in cases of thermic fever. Headache was relieved by applications of ice to the head. In mild cases, in which the temperature did not rise above 101° or 102° F. (38.3° or 38.9° C.), 5- or 10-grain (0.32 or 0.65 grammie) doses of antipyrin or antifebrin relieved the headache. In the majority of cases alcoholic stimulants were administered. In one case, in which cyanosis appeared, bleeding was resorted to, 8 ounces (240 grammes) of blood being withdrawn and the patient recovering. After the cessation of active treatment the men were placed beneath a cold-air blast, active friction of the skin being meanwhile maintained. In the cases in which the temperature was subnormal the treatment consisted in the administration of alcoholic stimulants or hot drinks and rest in the recumbent posture.

Kant, of Gerabronn, ¹³³ _{June 15, 19} has reported 10 fatal cases of insolation, occurring in the course of two days in a community of 30,000 inhabitants, the larger number of which was employed in agricultural pursuits. There had been no cases of insolation in the community during the preceding six years. In the year in question, after a season of but moderate temperature, there was a rather abrupt increase of the heat, together with decided humidity of the atmosphere, at a time when the people were, from industrial reasons, compelled to be unusually active in their work. In addition, in the 10 fatal cases, it was ascertained that there had been special factors of individual predisposition, such as excesses of one kind or another or previous disease. Of these cases, 6 were in females and 4 in males, all between the ages of 17 and 68; 8 were between 18 and 30; 2 over 60. In all, death resulted in the course of from half an hour to eight hours. In 8 consciousness

was lost and did not return. An additional factor is apparently wanting to explain the occurrence of a large number of cases at one time; this may reside in unusual telluric or atmospheric conditions, or possibly in a miasmatic or micro-organismal infection. In a prophylactic way, when the conditions favorable to the occurrence of insolation exist, the indications are to do the day's work in the early morning hours; to interrupt the work by intervals of rest; to permit the taking of stimulating drinks free from alcohol, such as tea and coffee, in addition to water in abundance; to retire early to bed; and to insist upon the sick and the weak remaining within doors.

Williams, of Philadelphia,¹² has reported the case of a man, 27 years old, a workman in a sugar-refinery, who had been overcome by the heat and presented a temperature of 110° F. (43.3° C.). There had been convulsions and the bowels were moving involuntarily. The pulse was scarcely perceptible at the wrists. By vigorous treatment with ice-enemata, ice-rubbing, digitalis, whisky, and strychnine, the threatening symptoms were relieved. The urine was found to contain albumen and hyaline, epithelial, and granular tube-casts. The knee-jerk could not be elicited upon the left, and the face was somewhat drawn upon the right. The right pupil was a little larger than the left. Ten days after coming under observation cough set in, with copious muco-purulent expectoration. Four days later the physical signs of pneumonia were detected. The disease pursued rather a protracted course, but ultimately terminated in recovery.

Wohlfarth, of New York,¹³ has reported a case of insolation in a hostler, engaged in part by day and in part by night, who was found in bed, in the course of a hot afternoon, unconscious, cyanotic, with irresponsive, contracted pupils, injected conjunctivæ, and dry, hot skin; the vessels of the neck pulsated strongly; the breathing was slow, irregular, labored, and stertorous; the action of the heart was labored, regular, and 116 in the minute; the radial pulse was relatively weak; the axillary temperature was 110° F. (43.3° C.). By means of ice and such material as could be obtained, cold applications were made, and the temperature came down to 108° F. (42.2° C.). The man died while on the way to the hospital.

(From the ANNUAL for 1894.)

Although several interesting papers upon this subject have appeared during the year, nothing especially new has been presented. Gannett, of Boston, ⁹⁹_{Apr. 20} and Koerfer, of Kreuzburg, ⁶⁹_{July 12} emphasized the value of chloroform to control the convulsions. In a case treated by the latter death seemed imminent, and the inhalation of chloroform was begun while preparations for a cold bath were being made. The result was surprising. The respiration soon improved and with it the action of the heart and the character of the pulse. The tendency to spasm also disappeared. On the theory that the phenomena of insulation depend upon the action of the superheated blood upon the central and ganglionic nervous system, Koerfer ⁶⁹_{July 12} believes that the utility of chloroform resides in the power of the drug to diminish the irritability of the cardiac ganglia, in this way preventing the muscular fatigue upon which, it is held, the fatal heart-failure depends; it also acts as a sedative upon the remainder of the nervous system, controlling the convulsive tendency, thus lessening heat-production and probably facilitating heat-dissipation, and, finally, permitting the employment of other therapeutic measures directed to the reduction of the temperature and supplying water to replace that lost in consequence of the high temperature. If there is much respiratory disturbance, manifested by expiratory dyspnoea, Gannett advocates the administration of oxygen by inhalation. Interesting contributions have also been made by Heisler, of Philadelphia, ¹¹²_{Apr.} and Somerville, of Tuscaloosa, Ala., ⁵⁹_{July 15} the latter's article being based upon twenty-two cases treated at St. Catharine's Hospital, Brooklyn, during the summer of 1892.

DENGUE.

(From the ANNUAL for 1889.)

Granby²⁰ states that, in his opinion, the most successful treatment of dengue has consisted in the administration of ipecac and tartar emetic and antimony, followed by antipyrin until the fever and pains have disappeared.

Dr. Carageorgiades, of Cyprus, reports an epidemic of dengue on that island,—the first that had occurred in over twenty years. The disease being endemic in Egypt, it had probably been communicated to Cyprus from that country.

(From the ANNUAL for 1890.)

De Brun²¹ contributes a paper upon the so-called red fever (*la fièvre rouge*) of Syria in relation to the epidemic of dengue observed at Beyrouth during the summer and autumn of the previous year. The dengue fever, which by certain authors is also described under the name of red (scarlet) fever, appeared in epidemic form after a number of sporadic cases had occurred, in the latter part of August, developing a great intensity in the month of September, and in the course of four months had attacked the greater portion of the population of that city. It was not until nearly the end of December that the epidemic ceased. The author thinks that the dengue of Syria differs very much from the dengue of intertropical regions, and that the fever, probably originating in the torrid zone, has a tendency to extend to regions more temperate. He believes that it menaces the meridional coasts of Europe. He calls attention to the extreme variability in the course of the reported symptoms of dengue in various epidemics. At first he considered that the patients whom he saw were attacked with febrile gastric distress, but they presented an extreme weakness out of all proportion to the gastric symptoms. Intellectual effort and physical exercise were alike impossible. He can only compare it to the depression which he observed in certain epidemics of influenza.

He soon recognized that he was in the presence of an infectious malady, from the great number of persons attacked and the

rapid diffusion of the epidemic, which not only attacked the majority of the population of Beyrouth, but spread, with great rapidity, over the whole coast of Syria. The majority of the patients complained of exquisite pain, principally localized in the head and lumbar region and the knees. Many of them presented a peculiar eruption followed by desquamation. He therefore concluded that the malady was an epidemic of dengue,—a disease which, after varying intervals, appears in an epidemic form along the Phœnician littoral. The fever was very irregular, no two temperature-charts presenting the same appearance. The sole constant character was the sudden elevation of temperature at the onset. In a number of cases the liver was congested and the patients presented a slight icterus. The spleen did not appear to be enlarged, nor was splenalgia observed. In a number of patients a systolic murmur was quite manifest in the region of auscultation of the mitral sound; but this murmur was transitory, and did not persist during convalescence. The respiratory organs did not offer the least symptom to which attention could be attracted. The author separates his cases into the following clinical forms: (1) the complete form; (2) the gastric form; (3) the rheumatic form; (4) the cephalalgic form; (5) the eruptive form. Convalescence was remarkable for its length and for the state of weakness in which the patients remained. Relapse was quite frequent, and it was not exceptional for the same patient to contract two forms of the affection in the course of the same epidemic. Certain patients appeared to be the subjects of a special predisposition, and succumbed once or twice to each invasion of the disease. The author calls attention to the close resemblance of influenza, but refuses that diagnosis on account of the absence of respiratory affections and the characteristic temperature. Concerning prognosis, it is certainly good, for he had not to register a single case of death which could, without doubt, be attributed to the dengue; but, again resembling influenza, it was liable to determine death in the subjects of previous disease of a grave nature. In the way of treatment, he allowed his patients to drink *ad libitum* lemonade charged with carbonic acid. Sodium salicylate gave good results against the pain. The same may be said of antipyrin, which, in addition, diminished the fever and calmed the headache. Chloral was employed with success against insomnia, which re-

sisted opium and its alkaloids. From quinine he did not perceive any benefit. During the disease the patient was allowed to drink grog and hot or cold bouillon at pleasure. During convalescence eggs, chicken, and beef were added to the diet. Christoph, ⁵ de Brun, ⁶ and Floras ⁷ also contribute interesting articles on dengue. A Berlin correspondent ⁸ quotes a description of the "Daggeian fever" (*Δάγγειος πυρετός*) of the Piraeus, and also the opinion of Hyrtl, that it is identical with dengue.

(From the *ASXTAL* for 1891.)

Onstein ⁹ arranges the symptoms of dengue as follows: The onset may be preceded by prodromes. At the beginning of the attack the face and body are covered with an erythematous eruption, attended with itching, which, in the course of a few hours, assumes the characters of the rash of scarlatina, or measles, or urticaria. The exanthem lasts for from twenty-four to forty-eight hours. With its disappearance the temperature remits, or becomes normal, for from two to four days, at the end of which time a secondary eruption appears, with moderate fever. In three days more the crisis occurs, the symptoms recede, and desquamation of the skin takes place. In a small number of cases relapses occur, even as many as three. Under such circumstances the disease may last for a month. The rash is the characteristic feature. There is also severe frontal, temporal, and deep orbital headache. Muscular and articular pains are conspicuous symptoms. The knees are favorite seats of invasion, giving the gait a peculiar, limping character. Nausea and vomiting, epigastric distress, heavily-coated tongue, bad taste, offensive breath, and complete anorexia are the signs of gastric derangement. At the beginning of the disease, the temperature, for two or three days, reaches about 104° F. (40° C.). There is then a gradual decline, so that on the sixth day there is apyrexia. Other less significant symptoms are vertigo, mental dullness, insomnia, and haemorrhages from mucous membranes. An abortive form of the disease is described. A curious antagonism has been observed to exist between the malarial fevers and dengue. The treatment throughout is symptomatic, except that antipyrin is said to be a specific for the pains.

Skottowe ²¹³ reports an epidemic of dengue in Fiji during the

year 1885. He repudiates the idea of an origin *de novo* or the explosion of latent conditions, but traces the probable lines of its importation. The period of incubation is brief,—from a few hours to a week. The attack sets in suddenly, with rigors, flushes of heat, elevation of temperature, general uneasiness, pains in the limbs, back, and head. The temperature rises suddenly, and the pain becomes intensified. The face is flushed, the eyelids swollen, the conjunctivæ injected; the eyeballs ache; there is photophobia. The temperature reaches its acme on the evening of the first or second day. The pulse is rapid, the appetite impaired, the stomach irritable, the tongue dry, the skin hot and parched. There is great restlessness. The urine is scanty. The tongue becomes heavily coated. Albumen occasionally appears in the urine. On the third day the prostration is extreme. The skin becomes moist; the initial rash appears, to pass away in twenty-four or forty-eight hours, with desquamation. The temperature falls, but remains febrile. The symptoms abate, pain diminishes, and general improvement takes place. Sleeplessness continues. In a day or two the temperature rises and there is an exacerbation of the symptoms. A second eruption appears and lasts for two or three days, also to be followed by desquamation. Between the eighth and tenth days the temperature falls, with profuse perspiration. The symptoms are mild, but the prostration remains. Convalescence is tedious; slight attacks last two or three days. The eruptions are evanescent or absent.

Maléas⁸⁴ Dec. 25, '89 publishes an interesting paper on the dengue epidemic at Constantinople in June, 1889, in the course of which he had an opportunity of observing some 650 cases. The disease was at first not recognized. It was thought to be rheumatic fever, or intermittent fever, or gastric fever. Its rapid spread and further observation finally led to the diagnosis of dengue. The author has no doubt of the contagious nature of the disease. Warmth and moisture are necessary for the development of the noxious agent which gives rise to the disease. The epidemic under consideration occurred during a hot summer following a rainy spring. With the advent of cold weather the disease dies out. The infection seems to have no predilections as to individuals, race, sex, age. Children, especially infants, are said to be more resistant than adults. Among the complications may be haemorrhages from various sur-

faces, insomnia, neuralgia, diarrhoea. Cases do not die directly of dengue. Quinine is useless in treatment. Antipyrin or salicylate of sodium may be used for the pain. The muscles and joints may be rubbed with liniments. Cocaine and chloral locally may relieve the itching. During convalescence bitter tonics may be prescribed.

Guillot²⁷ graphically describes the points of resemblance and contrast of dengue and influenza. Both have in common a brusque invasion, rapid elevation of temperature, lumbar pains, muscular pains, and cephalalgia. Lumbar pains and prostration are present in influenza, it is true, but in dengue they dominate the disease, lasting from beginning to end, and persisting long after all other symptoms have disappeared. It is difficult to describe the physical breaking down, the intellectual debility, the moral disorganization that dengue brings with it, and which may persist for weeks after the illness has entirely disappeared. In influenza there may be suffusion of the face, perhaps œdema; rarely, however, the transient erythema of dengue, approaching in its characters a scarlatiniform rash. In dengue there is a distinct eruption, active, different in different subjects, which may be raised into papules, followed by desquamation and itching for several days. The painful phenomena have certain analogies in the two afflictions. In influenza there is pain in the side, often accompanied by retrosternal pain, with a sense of oppression; in dengue, an incessant restlessness from a desire to find a position in which the pains may be avoided. In dengue the convalescence is prolonged and tedious, and attended with debility, incapability for exertion, capriciousness, or loss of appetite; while, in influenza, convalescence is more rapid and unattended with such complications. The respiratory involvement of influenza is wanting in dengue. Dengue is a benign disease *par excellence*. Who can say as much of influenza?

Skottowe²¹³ says that there are many points of resemblance between dengue and relapsing fever. In dengue, however, the fever only remits, vomiting is rare, eruptions are the rule, pregnant women do not abort, nor has a spirillum been found.

MILIARIA (SWEATING FEVER).

(From the ANNUAL for 1888.)

Brouardel⁹⁴ reported to the Paris Academy of Medicine the principal facts in regard to the epidemic of miliary sweating which prevailed in the departments of Sienne, Haute-Sienne, and Indre. Daremberg⁹⁵ wrote an important letter on the subject to the *Journal des Débats*, ably translated by the *British Medical Journal*. Daremberg accompanied Chantemesse and Thoinot to Montmorillon, —the centre of a district where more than 4000 cases, with 300 deaths, occurred. The disease is characterized by a profuse sweat and an eruption of small miliary vesicles. M. Littré believed that the disease was known to Galen, but the first authentic epidemic was the *sudor Anglicus*, "sweating-sickness," or *suelle Anglaise* of 1485, well known to historians. It was very fatal, according to Delaune, in London in that year, and Stow records that in 1499 it raged in the metropolis so that Henry VII and his court removed to Calais. In 1506 to 1507 the epidemic was terrible: Oxford was depopulated. In 1529 an epidemic ravaged Europe. In the seventeenth century it appeared in France and Germany. The mortality was less, but the miliary rash appeared in every case, whilst in the first epidemic it was rare. The patients in the English epidemic of 1485 mostly died within a few hours of the appearance of the first sweat, before the rash had time to develop. Precisely the same thing has occurred this year, several patients having died in two or three hours without any trace of rash. In the same district very mild cases have occurred, the patients being confined to their beds for a couple of days and then able to work. As in an epidemic in Poitou, in 1845, and another in the Aude, in 1864, the epidemic was preceded by many cases of eruptive diseases mistaken for measles. The troops of the garrison of Poitiers suffered severely from this "scarlatiniform measles." The first case of sweating sickness in 1887 occurred on April 16th in the commune of Saulgé. In the town of Montmorillon (5128 inhabitants) 47 persons died of the epidemic between May 3d and June

19th. At Moulismes (940 inhabitants) there have been 45 cases and 16 deaths. At St. Remy (893 inhabitants) there have been over 50 cases. In five or six communes hardly a dozen people have escaped infection. The more recent cases have been mild. The patients had little pyrexia, dyspnœa, or palpitation. They had profuse perspiration and an eruption, in some cases resembling measles, in others scarlatina, but always vesicular. The vesicles on the tongue formed ulcers. The patients felt no prostration and little loss of appetite. The earlier cases were of quite a different type. The patients showed the worst symptoms of malignant fever: profound depression, violent delirium, syncope, epistaxis, and intestinal haemorrhage. A great number of intermediate forms proved the identity of the very bad and very mild cases. The alleged anomalous forms of measles seen in the same district are also forms of sweating sickness. Brouardel, Chantemesse, Descout, and Thoinot have inspected the infected communes, and enforced, through the sanitary authorities, disinfection by means of sulphurous and carbolic acid. The peasants at first objected to these measures, and dreaded the damage which the acids might inflict on their furniture. They preferred the common French placebo, infusion of lime-tree blossoms, to quinine, and when stricken they closed their windows and piled eiderdown quilting and blankets over their bodies, notwithstanding the intense heat of the weather and the foetor developed by the practice. Daremberg believes that the disease is infectious. Another medical correspondent writes to the *Journal des Débats*, noting the fetid perspirations, the measles-like variety, and the extreme infectiousness of the disease. Some recent cases of so-called measles at Bourges appear to him to be sweating sickness.

Parmentier,⁹⁰ who accompanied the commission sent out under the direction of Brouardel to investigate this outbreak, has published a long account of its clinical features and epidemic relations.

(From the ANNUAL for 1890.)

Thoinot⁹² publishes a study of a severe epidemic of miliary or sweating fever which occurred in the Department of Vienne in 1887. Thoinot's own observations bring into prominence the following facts: The attack begins with gastric distress and discomfort, which may precede the other symptoms by several days;

but, in the majority of cases, a person apparently perfectly well will, during the day, complain of great fatigue and feebleness, and in the middle of the night be awakened by a profuse perspiration. The principal symptoms of the first period are perspiration, fever, general debility, and nervous phenomena of diverse nature. Among the latter may be mentioned dyspnoea, usually paroxysmal, and without any pulmonary lesion appreciable upon auscultation; a feeling of constriction in the epigastric region; great restlessness and delirium. Among the more infrequent are muscular cramps, especially in the muscles of the calf and the hand. The tongue is saburrall, and constipation is usual. The author would lay special stress upon two phenomena of the second period, which he thinks have been slighted by most authors, namely, cough and epistaxis. The latter may be quite profuse, and occur daily or several times a day. The eruption is generally manifested about the fourth day; very rarely it may appear on the second or third, or it may delay until the fifth or sixth. It is preceded by itching and persistent tingling, and, as a rule, all nervous phenomena are redoubled for the moment, to be mitigated when the exanthem appears. The eruption consists of two forms: 1. The miliary eruption, properly so called,—that is to say, a miliary papule which appears as a little acuminate point upon the cutaneous surface, and is slowly transformed to a vesicle, which discharges and finally exfoliates. 2. The exanthem, which is the substratum, the base of the miliary eruption. This may be classified into three forms: the rubeolar, which is composed of crescentic patches, more or less confluent; the scarlatiniform, where the cutaneous surface is of uniform coloration; and the amorphic or purpuric form, the cutaneous surface being tinged a dark red, which does not disappear upon pressure, and in which purplish patches are to be observed. In general, the eruption appeared first in rubeolar form, with plaques, which, becoming confluent, gave the scarlatiniform appearance, the color deepening and purpuric patches then appearing. Much irregularity is to be observed in this respect, the characters differing from day to day, even in the same individual. Under the name of *miliaris alba* may be described a special variety of the eruption, consisting of diaphanous vesicles upon a normally-colored skin. The sweating becomes less marked as the eruption progresses, the skin remaining moderately moist; fever is less active;

general debility and cephalalgia diminished. Nervous phenomena become quieted. The pulse-rate greatly diminishes, falling often to 55 in a minute; cough becomes more frequent, auscultation revealing bronchial râles; constipation persists. The stools are of the consistence and appearance of tar, and quite fetid. The urine, which at first was diminished, and in some cases totally suppressed for several hours, resumes its normal characteristics. Albuminuria is not to be found. Epistaxis continues in some cases, other haemorrhages being added. Haemoptysis occurred infrequently, but in several cases very abundant intestinal haemorrhages were observed.

The third period is that of desquamation, which process may take place discretely at separated points, or in large patches. The disease has virtually come to an end when the eruption appears, and usually about the eighth or the tenth day convalescence begins. This is uncertain and tardy. Recuperative powers seem to be in abeyance; nor is this condition in relation with the gravity of the case, for the most benign forms may have the most tardy and difficult convalescence. The convalescents present pronounced anaemia; very often there is oedema of the lower limbs; the muscles of the face exhibit fibrillary tremors; the tongue trembles after the fashion of the tongue of paralytics; insomnia, persistent anorexia, and a tendency to profuse perspiration upon the slightest exertion, are noticed. Among the rarer phenomena are rectal crises analogous to those of locomotor ataxia, crises of costal neuralgia, and irregularity of the heart. These phenomena disappear gradually, but it may be two months or more before the last trace of the disease has been effaced.

Previous authors have divided the disease into benign and grave forms, and Rayer distinguishes also an insidious form. Thoinot, following Brouardel, would specially discriminate only the two extremes, *i. e.*, the ambulatory form and the fatal form. The rapidity of the fatal form is extremely great. The author knows of many cases which terminated fatally in forty-eight hours, exhibiting the phenomena of profuse perspiration, hyperpyrexia, restlessness, sudden delirium, dyspnoea, and excessive epigastric constriction. In other cases the onset of the attack presents nothing peculiar, but suddenly, on the second, third, or fourth day, all of the phenomena are aggravated, and in a few hours the patient is dead.

Most frequently death occurs before the appearance of the eruption or coincidently; so that those patients who have safely arrived at the completion of the eruption may be considered out of danger. Death after the fourth or fifth day is very rare. It has, however, occurred in a relapse after the disappearance of the eruption.

Among the anomalous forms of the disease are that without eruption and that without sweating. The coincidence of epidemics of miliary fever with cholera, on the one hand, and on the other with certain exanthemata, particularly roseola, scarlatina, and, to a less degree, variola and varicella, is carefully considered, and the diagnosis set forth at length. The study of the geographical distribution is extremely elaborate and complete. The author does not believe the disease to be transmissible by contact, but by infection. It is, in all probability, of microbian origin. The period of incubation may be very short,—less than twenty-four hours. The maximum period cannot be fixed. Neither age nor sex appears to have any influence upon susceptibility, but the disease manifests a curious predilection for the robust, as also for alcoholics. It is endemo-epidemic in France. It recurs in the same patient. It may pass from the mother to the foetus.

MISCELLANEOUS FEBRILE DISORDERS.

MOUNTAIN FEVER.

(From the ANNUAL for 1888.)

Curtin⁹¹ contributed to the *Transactions* of the meeting of the American Climatological Association for 1886 an interesting and important study of the so-called Rocky Mountain fever. He quotes Dougan as saying that the term "mountain fever" has by long-continued and frequent use almost established itself in the nomenclature of disease in the mountain districts of the West. Whether or not its use is proper as designating a separate and distinct type of fever, a pathological entity, may well be questioned. Dr. Curtin believes that proof of this is wanting.

Van Eman⁹² thinks that all of the Western fevers belong to one of three classes: (1) febricula, or simple irritative fever; (2) malarial, which may be divided into two general subclasses,—remittent and intermittent; (3) typhoid, to which class belong not only the well-marked typical cases of typhoid, but also nearly all of those now usually called typho-malarial,—"a name for which there is no excuse."

(From the ANNUAL for 1894.)

Work, of Pueblo, Col., ⁹³ expresses the opinion that so-called mountain fever is not a disease *sui generis*, but a group of symptoms dependent upon distinct pathological conditions. Imperfect forms of specific continued fevers, such as enteric and relapsing, localized inflammations partially developed, acute catarrhal inflammations of the alimentary or respiratory mucous membrane, and disturbance or exhaustion of the nervous system, will, if diligently sought for, furnish a basis of diagnosis. The majority of cases in adults can be grouped under the head of simple continued fever; next in frequency is enteric fever of modified type. In eighteen of fifty cases of mountain fever rose-spots were present, and in five fatal cases the intestinal lesions of enteric fever were found. Woodward, of Richmond, Va., ⁹⁴ records the results of an analysis of sixteen cases of atypical enteric fever or mountain fever, exhibiting symptoms peculiar to both enteric fever and bilious remittent fever.

AFRICAN BLACK-WATER FEVER.

(From the ANNUAL for 1890.)

Robert Reilly, ²⁶ _{Dec., '98} states that African or "black-water" fever is more prevalent during a north wind, and follows definite geographical lines. Natives and Europeans are subject to it alike, more particularly in changing from district to district and from latitude to latitude. Among the chief characteristics may be mentioned a constant high temperature, intense bilious vomiting, and partial suppression of the urine, that voided being very dark or mahogany-colored. He does not state whether it is albuminous or not. Pneumonia also occurs as a complication, and some observers have gone so far as to regard this as a favorable symptom, because they consider that it tends to counteract the tendency to cerebral complications, which are so common and so frequently fatal. He regards quinine as being inefficient as a prophylactic measure. In fact, he states that he has seen those who were in the habit of using quinine as a preventive suffer more from this fever than those who had been hitherto unaccustomed to using it in any form.

The treatment advocated consists in early purging and the subsequent administration of a mixture containing liq. ammon. acet., fʒij (62 grammes); spt. æther. nit., fʒj (31 grammes); tinct. hyoscyam., fʒvj (23 grammes); aquæ camph., ad fʒvij (249 grammes); fʒss (15 grammes) every three or four hours. Salol, or salicylate of phenol, was tried with good effect in doses varying from 10 to 20 grains (0.65 to 1.30 grammes) every two hours. Potions of lime-juice and effervescent draught were also administered. Fruits were given freely. The diet should be essentially light and nourishing, taken in small quantities at regular intervals. Quinine is useful as convalescence sets in.

(From the ANNUAL for 1894.)

At a meeting of the Pathological Society of London, Wheaton ² ₁₈₉₄ presented preparations from organs taken from cases of so-called West African "black-water" fever. The disease occurs in those who have previously suffered from malarial fever, and is excited mainly by exposure to chill or to extreme heat. The patient, after a preliminary stage of shivering, numbness of the extremi-

ties, pain in the loins, and general malaise, develops general jaundice, fever (the temperature rising to 103° F.— 39.5° C.), and passes porter-colored urine. The attacks recur again and again after fresh exposure to the exciting cause, and are often followed by nephritis and haematuria. In grave cases bilious vomiting occurs, and death with symptoms of uræmia. The urine is acid and it contains haemoglobin, but blood-corpuscles are absent. Enlargement of liver and spleen is not common. From this description it is seen that, with the exception of the development of bilious vomiting and its high mortality, the disease has a close resemblance, clinically, to paroxysmal haemoglobinuria. The preparations showed that the tubules in the pyramids of the kidneys were full of masses of haemoglobin, with which the lumen of the secreting tubules was also packed. The cells of the secreting tubules were also swollen and granular. There were no extravasations of blood-corpuscles. The spleen contained collections of haemoglobin in an amorphous form, and the hepatic cells were full of granules of pigment.

NEGRO LETHARGY (SLEEPING SICKNESS).

(From the ANNUAL for 1891.)

At a meeting of the London Clinical Society, Mackenzie²² _{Nov. 10} presented a case of "negro lethargy," or the "sleeping sickness," —an almost always fatal disease occurring in full-blooded negroes on the west coast of Africa. It attacks both sexes alike and occurs at all ages, but is most common between 12 and 18. No distinctive morbid appearances have been found after death, nor is the etiology of the disease known. The symptoms indicate an affection of the higher nervous centres.

Mackenzie's case occurred in a married negro of 22, with two children, who had always lived on the Congo and many of whose relatives had fallen prey to the fatal malady. He had come to England for treatment. The disease was preceded by an attack of diarrhoea, which lasted a month; there was an inclination to drowsiness at times during the day, and a slight drooping of the eyelids; muscular power was impaired; the gait was tremulous and tottering; on one occasion the patient lost consciousness, had high temperature, and sweated profusely; on two occasions the urine

contained albumen; filariæ sanguinis hominis were at all times found in the blood; the patient began to lose flesh and strength; irregular pyrexia was observed; the mental condition became torpid and lethargic; the patient slept for many brief periods, the total amount of sleep not exceeding that usually taken by healthy people.

(From the ANNUAL for 1892.)

Mauthner⁵⁷, has called attention to the fact that so-called sleeping sickness presents all of the symptoms of chronic poliencéphalitis. A characteristic manifestation of both is ptosis. The pathological lesion is likely to escape observation.

MALTA FEVER.

(From the ANNUAL for 1890.)

Bruce⁵⁸ defines Malta fever as "an endemic disease of long duration, characterized by fever, continuous, remittent, and intermittent in type; in most cases enlarged spleen, profuse perspiration, sudamina, constipation; relapses almost invariably; accompanied by pains of a neuralgic or rheumatic character, sometimes swelling of joints or orchitis; ending almost always in complete recovery; in fatal cases, enlargement and softening of spleen, congestion of duodenum and upper part of jejunum, no swelling or ulceration of Peyer's glands and the constant occurrence in various organs of a species of *micrococcus*." The most appropriate name, according to an editorial writer,⁵⁹ is that of Veale,—*febris complicata*. The same writer states that the disease declares itself gradually, with headache, sleeplessness, loss of appetite, and thirst, often without shivering or diarrhœa, and without spots. Symptoms of this kind, with more or less severity, last for three or four weeks. Apparent, but deceptive, convalescence then usually sets in, to be followed in a few days by a relapse, with rigors, intense headache, and fever, frequently with diarrhœa. In this state the patient may continue for five or six weeks, with more or less delirium. Improvement again sets in, to be followed, it may be, by another relapse in about ten days or a fortnight, with shivering, headache, sleeplessness; great debility, with night-sweats; pains in the hips, knees, ankles, and elbows, and often in one or both testicles. Again the patient enters on a state of convalescence, which may

last for a month or six weeks. The old symptoms may again appear, with extreme debility; a thickly-coated tongue, with thirst; a temperature ranging from 105° F. (40.55° C.) in the evening to nearly normal in the morning, with night-sweats, bringing no relief to the general distress. The rheumatic symptoms are the most constant and the most distressing; all the joints, large and small, may suffer. Veale describes cases in which the intervertebral joints, especially those of the lumbar region and the sacroiliac synchondroses, were so severely affected that the patient "dreads every movement; he will lie for days in one position, risking the formation of bed-sores and resisting the desire to evacuate his bowels rather than encounter the suffering that a movement will entail. Oftentimes the tendo Achillis and the fibrous structures around the ankle-joint are involved; but perhaps the lumbar aponeuroses and the sheaths of the nerves issuing from the sacral plexus are still more commonly affected."

(From the ANNUAL for 1891.)

Before the Epidemiological Society of London, Gipps ⁶ read a paper on "Malta Fever," which, he maintained, was a specific disease generated by the foul condition of the harbor. It was most prevalent during the hotter months, when putrefaction was active. The crews of vessels, anchored for six months of the year, suffered far more than the garrison, and the disease, when occurring among the troops, was mostly contracted in crossing the water. It seemed distinct from the remittent fever common to other ports of the Mediterranean. It only appeared on board vessels recently stationed at Malta, and within the incubation period of fourteen days. The term "typho-malarial" was to be deprecated because there were no intestinal lesions or intermittent features. The disease set in with malaise, headache, severe lumbar pains; fever, the temperature rising from 101° F. on the first day to 104° F. (38.33° to 40° C.) or upward, with a daily range of 2° or 3°; perhaps with bilious vomiting and diarrhoea, succeeded by constipation. The tongue remained coated, but moist. The duration of the fever was from a few weeks to several months. When convalescence set in, recovery was rapid, and was assisted by removal to a better climate. The mortality did not exceed 2 per

cent. In some cases death occurred within the first week. In these the liver and spleen were greatly enlarged. The most troublesome complication was a quasi-rheumatic affection of the muscles, of the lumbo-sacral nerves, and of the periosteum, especially around the tibia; these tended to spontaneous cure and yielded speedily to treatment at one of the German baths. In the treatment of the fever itself quinine did harm. Symptoms were combated as they appeared.

(From the ANNUAL for 1893.)

Milnes⁶ expresses the opinion that the same affection is described in different places by the names Malta fever, Rock fever, Cretan fever, and with which the local fever of the Red-Sea ports is identical. While in a series of cases some will present the characteristics of enteric fever, and others, perhaps, those of malaria, a large number present features of neither. An attack may be of varying duration, and of sthenic or asthenic type. The invasion is marked by loss of appetite, often by headache or backache, but seldom by rigor or vomiting. The rise of temperature, sudden or gradual, reaches its maximum early,—generally within the first three days. There may be some slight pulmonary or pleural congestion. In rare cases slight jaundice occurs. At a late stage rheumatism is not an uncommon complication. The tongue is covered throughout the attack by a dense white fur, the disappearance of which may be considered an indication of recovery. The bowels are almost always constipated; intestinal symptoms resembling those of enteric fever are wanting. Enlargement of the spleen is rarely to be detected. If recovery do not occur within a week or ten days, progressive debility and emaciation appear, together with irregularity of temperature without rigors,—a condition that may continue for weeks or months, and for the relief of which change of climate seems essential. In the line of treatment, patients were kept in their hammocks and given only a liquid diet until the tongue became clean. A dose of calomel was given at the outset, and a saline mixture containing potassium nitrate, sodium bicarbonate, with or without magnesium sulphate, according to the condition of the bowels, thrice daily. In a considerable number of cases quinine was given in large doses,—from 25 to 40 grains (1.62 to 2.59 grammes).

In connection with the foregoing, Oliver, of Newcastle-on-Tyne, ⁶ records having observed six or seven cases of a febrile disorder in sailors who had recently come from the river Danube, and to which he gives the name of Danubian fever. Among the symptoms present were vomiting, at times of blood; diarrhoea, the stools at times containing blood; albuminuria; haematuria; chills, fever, and sweats; enlargement of the spleen; sponginess and bleeding of the gums; delirium; vertigo. In treatment, quinine, followed by arsenic, proved useful.

Bond, of Bradford, ⁶ relates that of a crew of 25, aboard a vessel that had just returned to England from a cruise on the Danube, 13 presented symptoms of what is called Danube fever, and 1 died. The principal points noted at the post-mortem examination were extreme congestion of internal organs, splenic enlargement, meningitis, and endocarditis. The illness was attributed to drinking Danube water.

CYPRUS FEVER.

(From the ANNUAL for 1893.)

Carageorgiades, corresponding editor in Cyprus, Greece, expresses the view that Cyprus fever, or *febris complicata*, is a distinct affection; not typhoid, not malarial, not relapsing fever, but presenting some analogies with Malta and Mediterranean fevers. The disease is characterized by neuralgic or rheumatoid pains, constipation, night-sweats, often enlargement of the spleen and of the liver; rarely, congestion of the peritoneum, of the duodenum, or of the jejunum. The duration is protracted, the course of the disease marked by recurrences. Recovery is the usual termination. Nothing is accurately known of the etiology. The disease has been observed at the sea-board under conditions favorable to the development of organic fermentation. It is most prevalent in the summer; it is endemic, and is most common in persons between 20 and 35. There is no evidence of its contagiousness. An attack confers immunity. The pathological changes are not distinctive. The presence of micro-organisms in the blood has been described. The period of incubation is from six to ten days. The invasion is insidious; fever, at first intermittent, then remittent, finally continued, is present. Malaise, headache, sleepless-

ness, loss of appetite, thirst, nausea, sometimes vomiting are also present; the tongue is not heavily coated; the bowels are constipated. Variously distributed pains are felt. The symptoms continue for from one to four weeks. Convalescence seems about to set in, but rigors, headache, diarrhoea, and febrile symptoms appear, and may continue for five or six weeks more. Prostration is decided, and night-sweats may occur. There may likewise be bleeding from the nose. Convalescence now sets in. Rarely, another relapse takes place. The disease is more especially to be differentiated from enteric fever and relapsing fever. The treatment is largely symptomatic.

MEDITERRANEAN FEVER.

(From the ANNUAL for 1894.)

Bruce²,³ describes the *micrococcus melitensis*, which he, with others, believes to be the specific etiological organism of Mediterranean fever, as round or slightly oval in form, and measuring, in dried preparations, about 0.33μ in diameter. For its detection a magnifying power of 1000 or 1500 diameters is required. Viewed in a drop of water, unstained, the microbes are seen as bright points in active molecular movement; the great majority of them single, a few in pairs, and sometimes in chains. They possess no power of spontaneous movement. They can readily be stained in a watery solution of gentian-violet, but they become decolorized by Gram's method. Treating specimens with alcohol at once removes all color from the micro-organisms, even after fixing them with osmic acid, corrosive sublimate, or tannic acid. In nutrient peptonized broth, kept at 37° C. (98.6° F.), no change can be seen for the first few days, but after some time the fluid becomes decidedly cloudy without any formation of pellicle on the surface. The best medium for the cultivation of this species is ordinary 1.5-per-cent. peptonized agar-agar beef-jelly.

Hughes⁶,⁷⁸ details the results of eighteen months' work in Malta devoted to a study of the affection variously described as Malta fever, Gibraltar fever, Rock fever, Neapolitan fever, Mediterranean fever, etc. He found the disease characterized clinically by a peculiarly irregular temperature-curve, consisting of intermittent waves of pyrexia of a distinctly remittent type, each wave

lasting from one to three weeks, with generally an apyrexial interval of two or three days. In rarer cases the remissions may become so marked as to impart an almost intermittent character, but distinguishable clearly from the paroxysms of ague. This pyrexial condition is usually very chronic, lasting even six months or more, and is not markedly affected by quinine or arsenic. It is usually accompanied by obstinate constipation, progressive anaemia, and debility, and is followed, in a large number of cases, by very chronic neuralgic and rheumatic complications, from which the patient may not recover for perhaps two years. The death-rate is very low; but the average stay in hospital is from seventy to ninety days. The peculiar micro-organism already described by Bruce and Gipps was found in the spleen. Westcott², describes some of the complications that may arise in the course of Mediterranean fever. The onset of the disease may be insidious or sudden, with fever of remittent type, simulating that of enteric fever; but the temperature soon becomes irregular, and, generally toward the end of the second week, the concomitant constitutional symptoms commence to disappear, the tongue cleans, the appetite returns, the mental condition improves, and convalescence appears about to set in; but the temperature remains high, and at any moment the patient is liable to suffer from a complication resembling rheumatic fever; the joints swell and become painful, and the constitutional symptoms of fever return, but the characteristic perspiration of rheumatic fever is absent, and there is evidently no relation to it. This complication, like every symptom of this disease, is of the most uncertain duration and degree; it may attack only one or two joints and last only a day or two, or it may cause permanent joint disease. Local paralysis occurs frequently. The extensor muscles of the feet are those almost exclusively affected.

In a second paper Hughes², points out that the Maltese suffer proportionally less from Mediterranean fever than British troops, though the disease does not appear to show that special predilection for new-comers that is so commonly noticed in the case of enteric fever. The frequency has, on the whole, slowly but steadily diminished among the troops in Malta during the past 75 years, owing, doubtless, to constant sanitary improvements in barracks. The mortality has likewise declined, and epidemics of note have

become fewer. Though intermittent fever in endemic form does not exist at Malta, the seasonal prevalence of Mediterranean fever corresponds exactly with that of malarial infection. The fever is certainly not contagious from man to man, and, both in localization and general clinical character, it has a close analogy to enteric fever. There is no evidence that infected food or drinking-water has any causal connection with the fever, and the introduction of a pure water-supply, under pressure, has not lessened its prevalence at Valletta. The facts point to an air-borne virus on shore, related to defective drainage. The conclusion is finally reached that, though closely allied to enteric fever, Mediterranean fever belongs to the mobile group characterized by an uncertain duration, a tendency to relapse and a feeble power of conferring immunity to subsequent attacks, and that it is a link between enteric fever and the so-called malarial marsh-fever (intermittent ague.)

TONKIN FEVER.

(From the ANNUAL for 1890.)

Boinet²¹¹ _{Apr. 21} has demonstrated what he believes to be a specific micrococcus in the blood of an Annamite coolie, the subject of bilious remittent fever contracted in Upper Tonkin.

Blanc²⁴³ publishes an elaborate study of the bilious malarial fevers of Tonkin.

PSILOSIS.

(From the ANNUAL for 1891.)

Thin² _{Jan. 14} describes as psoriasis a condition, common in Batavia and known in the East as Indian sprue, in which the tongue is fissured and ulcerated, its mucous surface, as well as that of the oesophagus and of the small and large intestines, being in places destroyed. The disease is insidious in its onset and chronic in its course. It is attended with difficulty in swallowing, with diarrhoea, and with loss of weight. There is a peculiar fluctuation in the symptoms, which improve greatly upon a milk diet, to recur upon indiscretion. The lesions are supposed to be due to disease of the superficial blood-vessels, but its etiology has not yet been determined.

(From the ANNUAL for 1892.)

Begg,² considers psilosis as not being a disease of the mucous membrane, but a result of interference with the function of absorption of the products of digestion, the lesions representing secondary processes. He ⁴⁹⁶ _{Dec. 15, '90} believes the symptoms to be dependent upon the presence of an organism in the intestines, by the action of which the contents of the bowel are rendered unfit for absorption. In treatment he employs yellow santonin dissolved in olive-oil. Perfect rest in the recumbent posture is directed, and, in accordance with the percussion-note of the abdomen, treatment is begun with or without a dose of castor-oil, guarded by tincture of opium. An enema may also be given at bed-time. Hot fomentations are employed to relieve the painful flatulent distension. The diet consists principally of milk, with or without lime-water. It is important to take nourishment in small quantities at frequent intervals. Five grains (0.32 gramme) of santonin, in a teaspoonful of olive-oil, are given once daily, early in the morning or at bed-time, for six days. Caton, of Liverpool,¹⁸⁷ _{July} reported a case of psilosis, or Indian sprue, in a man, 48 years old, who had spent many years on the Chinese and Indian coasts.

ARDENT FEVER.

(From the ANNUAL for 1893.)

Miller, of Portsmouth, ² _{Dec. 19, '91} reports a case of ardent fever in which recovery followed the subcutaneous administration of apomorphine. The case was that of an artilleryman, 31 years old, who had served in the West Indies and had suffered from enteric fever, bronchitis, and ague. He reached England in a semiconscious state, with flushed face, congested eyes, partially dilated pupils, and hot and dry skin. The temperature was 106° F. (41.11° C.). Twenty grains (1.30 grammes) of quinine were given and the man was put into a wet-pack, but his condition remained practically unchanged. Later, $\frac{1}{10}$ grain (0.006 gramme) of apomorphine was injected beneath the skin of the arm. Soon afterward 2 ounces (60 grammes) of yellowish, undigested food were vomited and the temperature declined. Thereafter the patient continued to improve, and he had soon entirely recovered.

MILK SICKNESS.

(From the ANNUAL for 1891.)

At the Tenth International Medical Congress, at Berlin, Kimmel³⁹ _{Sept. 12} read a paper on milk sickness,—a disease met with in the central-western portion of the United States. The affection seems to prevail in parts of the country newly opened to settlement, disappearing when the soil has been brought to a high state of cultivation. Animals are liable to contract the disease when they pasture late at night or early in the morning. The animal affected usually remains in one place or wanders about a limited area, holding the head to the ground. The appetite is impaired and constipation is the rule. Later, the animal presents tremor, which continues for three or four days, at the end of which death occurs, although the disease is not invariably fatal. Oxen and bulls are affected, cows escaping as long as they give milk. The disease is contracted by man by drinking milk from cows of an infected herd. In man the symptoms are constant, and the diagnosis, as a rule, easy. There is, at first, marked fatigue and languor, followed by anorexia, nausea, vomiting, pyrosis, obstinate constipation. Excessive thirst is a prominent symptom, though the fluids taken are rejected. There is neither elevation of temperature nor alteration of pulse. The skin is dry, the tongue moist and coated. Respiration is difficult and sighing. The abdomen is retracted, but not tender. Delirium is rare. Prostration increases. The patient cannot move hand or foot. Even the eyelids become immovable. Death finally occurs in coma. As a rule, fatal cases last from fifteen to twenty days. When recovery takes place, the duration is from five to ten days. Convalescence is apt to be prolonged and tedious. Milk sickness is distinguished from typhoid fever, malarial affections, and gastro-enteritis by the absence of fever. It may be complicated by malarial fever. Quinine, alcohol, and other stimulants are recommended in treatment. The disease in man can be traced to the use of milk or butter from cows pasturing with infected cattle. The disease is believed to be microbic, and the infecting parasite allied to that of malaria.

(From the ANNUAL for 1894.)

J. Howell Way, of Waynesville, N. C.,⁵ _{Sept.} gives an interesting description of the affection known as milk fever. The disease

appears both in animals and in man. In the latter the onset is gradual and insidious; the patient becomes apathetic, and finds it impossible to arouse himself to his accustomed activity. Cephalalgia, anorexia, nausea, and marked thirst represent the early history of the disease. The tongue, at first covered with a white fur, becomes, after a few days, large, heavy, and flabby, the breath assuming a sweetish foulness comparable to the breath of an unweaned calf. Vomiting occurs frequently, and is attended with very little immediate relief. The fluid expelled from the stomach most frequently has a slightly bluish color, and is not, as a rule, very abundant in quantity, many of the efforts at emesis being unattended with the ejection of any fluid whatever. The emesis ceases late in the course of fatal cases from sheer exhaustion, hic-cough being then a frequent source of suffering. The abdomen is flaccid, and peristaltic action seems to be suspended, although diarrhoea is sometimes observed. Marked aortic pulsation may sometimes be felt through the abdominal parietes. The frequency of cardiac action is not increased, as a rule; in the earlier and middle periods of the disease it may be at times slowed, but in the profound prostration that ensues prior to death it is increased and labored, and the larger arteries seem to be unusually well filled. The temperature is generally subnormal, ranging from 97° to 98° F. (36.1° to 36.7° C.). In grave or fatal cases the sufferer sinks into a comatose condition.

SOUTHERN CATTLE FEVER (TEXAS FEVER).

(From the ANNUAL for 1891.)

Smith ⁹ makes a preliminary report of observations made in the course of an epidemic of Southern cattle, or Texas, fever, in the latter part of 1889. He believes the disease infectious and of malarial type. Healthy cattle from North Carolina infected a small, inclosed patch of pasture at the Experiment Station of the Bureau of Animal Industry. The infection was maintained and increased in intensity after the removal of the animals which brought it. It did not spread. The animals attacked showed elevation of temperature, marked prostration, haemoglobinuria, with diminution of the number of red blood-corpuscles. The spleen was enlarged, its pulp disorganized. The liver was

yellowish brown in color, its parenchyma bile-stained. Many of the biliary canaliculi were plugged with consistent, cylindrical masses of bile. The liver-cells had partly undergone fatty degeneration. The bile was thick and viscid. The kidneys were suffused. In some cases there were ecchymoses in the duodenum. Cultures of the blood and of fluid taken from various organs in different media were unsuccessful. Small, round bodies, however, were found in many red blood-corpuses, situated centrally or eccentrically, staining poorly in an aqueous solution of methyl-violet, but very well in aniline-water solution. They resembled micrococci in size and form. Unstained, they had the appearance of transparent spaces in the corpuscles. Besides the spherical forms, ovoid bodies were not uncommon, occurring usually in pairs. A still rarer pear-shaped form was encountered in stained preparations of the blood. It was rounded at one pole and drawn out into a short filament at the other. These, also, almost invariably occurred in pairs. One other abnormal form was found in the blood. When dried cover-glass preparations were stained with Loeffler's alkaline methylene-blue, the surface of a few red corpuscles appeared as if dusted with fine particles of coloring matter. As a rule, the circulating blood contained comparatively few parasites. They are filtered out by the spleen and liver. The organism may represent a phase in the life-history of some of the lowest mycetozoa, such as the monadineæ; or it may belong to the group of sporozoa, some of which are pronounced cell-parasites.

(From the ANNUAL for 1894.)

In examinations of over one hundred cases in fourteen different outbreaks, Smith, of Washington, D. C.,⁵⁰ has found, within the red corpuscles of fresh blood from cattle affected with Texas fever, pale, rounded, protoplasmic masses, sometimes displaying amœboid movement, which he believes to be the causative parasites of the disease (see ANNUAL for 1891). Occasionally, these bodies are spindle-shaped or pear-shaped; in the latter case, two, with their narrow extremities opposed, are often present in one corpuscle. In the broader extremity a tiny, dark object, rarely replaced by a vacuole-like structure is to be seen in the fresh state. The parasite is from 2.5 to 4μ long, and from 1.2 to 2μ

thick. It stains well on cover-slips with alkaline methylene-blue. As a result of the presence of the organism the red corpuscles are destroyed. The proportion of parasites in the blood is seldom higher than 1 or 2 per cent., but when the animal dies or is killed in the febrile stage a large number of blood-corpuscles in the capillary areas of the various tissues are found to be infected. In the later stages of the fever free parasites also are to be found. Cattle inoculated with the blood of diseased animals acquire the disease, presenting the earliest symptoms in the course of a few days. Other species of animals treated similarly remain healthy. Infection is conveyed through the agency of ticks, which are found upon the skin of the animals in large numbers, especially upon the inner aspect of the thighs and about the udders. The female drops off when ready to lay her eggs, and these are deposited upon the ground. The young crawl on to the cattle soon after their liberation and carry with them the infection. Meadows may be infected in the absence of cattle by strewing of the grass with pregnant ticks.

The disease may be experimentally transferred from animal to animal by means of the ticks. The latter cannot exist below a certain temperature; frost destroys the eggs. The prevalence of the disease in the Southern States of America is thus explained; its spread is to be prevented by destruction of the ticks.

PEACH FEVER.

(From the ANNUAL for 1894.)

Anderson, of Hagerstown, Md.,¹ calls attention to a condition not infrequently observed among persons engaged in packing and canning fruits. Two types of the affection are observed: (1) the psychotic variety, which is observed in persons having a lively imaginative faculty, and is characterized by mental exaltation and ideas of grandeur; (2) true peach fever, caused by contact with the fruit in the course of its being picked and packed for the market. The latter is believed to be a morbid condition of the respiratory and cutaneous surfaces, with some consequent systemic disturbance, due to irritation from the pubescence of the skin of the common peach,—the *Amygdalus Persica*. The Schneiderian membrane first becomes irritated and tumefied, and yields a large flow of serum

and mucus. The frontal sinuses, the conjunctivæ, and the larger bronchi may, by extension, be likewise affected. In susceptible subjects cough and asthma may be excited. On the skin the chief manifestation is found about the wrists, forearms, neck, and forehead. It commonly begins and ends as a macular or papular eruption, but it may advance to a true dermatitis and to pustulation. The temperature may rise as much as 2° F. (1.1° C.), as a result of the systemic disturbances induced by the respiratory and cutaneous irritation. Thin-skinned and neurotic young women suffer more commonly and for a longer time than pachydermatous men and the older women. Those who have been engaged in the business for some years seem to have become proof against the irritant. There is no evidence to show that the disorder is contagious.

GLANDULAR FEVER.

(From the ANNUAL for 1890.)

Pfeiffer ³⁶⁶ _{May} describes, under the name of glandular fever (Drüsenvieber), a disease manifested by an acute, painful swelling of the lymph-glands in the entire region of the neck, a temperature ranging between 39° and 40° C. (102° and 104° F.), a mild congestion of the fauces, and constipation. It lasts from eight to ten days. The prognosis is good, and the glandular swellings do not proceed to suppuration. The character of the disease is that of a house and family epidemic, and this would point to an infectious origin. The author leaves the question open whether his glandular fever is a distinctive disease or simply an abortive form of other well-known processes. Therapeutically, he employed oleaginous inunctions, wrapping of the throat in cotton, and rest in bed. In 2 cases Huebner observed nephritis.

(From the ANNUAL for 1892.)

Protassow ³⁶⁶ _{B.M.H.4} reports 4 cases of so-called gland fever. Pfeiffer ³⁶⁶ _{May 10, 1890} describes as gland fever an infectious constitutional affection characterized by rapid growth and painful swelling of the cervical lymph-glands, with considerable elevation of temperature. He reports 4 cases. In children the occipital glands are frequently enlarged, but not painful. The glands in front of the sterno-

mastoid muscle also become enlarged, but without pain or other special feature. The chief characteristic is the rapidity with which the swelling increases and the temperature rises, associated with a recession of the symptoms in the course of a few days or weeks. Huebner reports 4 cases. The first followed measles; the second and third were succeeded by acute nephritis; the fourth was accompanied by an urticarious exanthem. Rauchfuss ²⁰⁶ reports 2 cases, and maintains the distinction of the affection from the glandular enlargement associated with pharyngeal and nasal affections, and excludes the possibility of the existence of an abortive form of scarlatina. Filatow has described an acute idiopathic swelling of the lymph-glands at the upper margin of the sternomastoid muscle, especially between the auricle and the mastoid process and behind the angle of the lower jaw, associated with high temperature. Children between 2 and 4 years old and older are attacked. The affection is independent of local processes in adjacent structures. For the first week or ten days the disease pursues the course of an acute adenitis, then gradually to subside. Suppuration is uncommon. The condition is to be distinguished from parotiditis by its situation, by the firmly elastic consistence of the definitely circumscribed swelling, by its unilateral distribution, and by the protracted convalescence. Korsakoff ⁵³⁰ describes a glandular swelling that develops after recovery from scarlatina and often precedes the advent of a nephritis. (See chart, next page.) Protassow's first case occurred in a boy, 8½ years old, who complained of transient pain in the left knee-joint and, on the following morning, of pain in the throat; at night fever set in; sleep was restless. On the next day vomiting occurred. The cervical glands were noted to be enlarged and painful. Four times in the course of seven weeks the manifestations were repeated, but ultimately recovery took place. Inunctions of camphor ointment were applied to the swollen glands, and quinine tannate was administered internally. The second case occurred in a 5-year-old brother of the first. The third and fourth cases were in two brothers in another family, 4 and 9 years old, respectively.

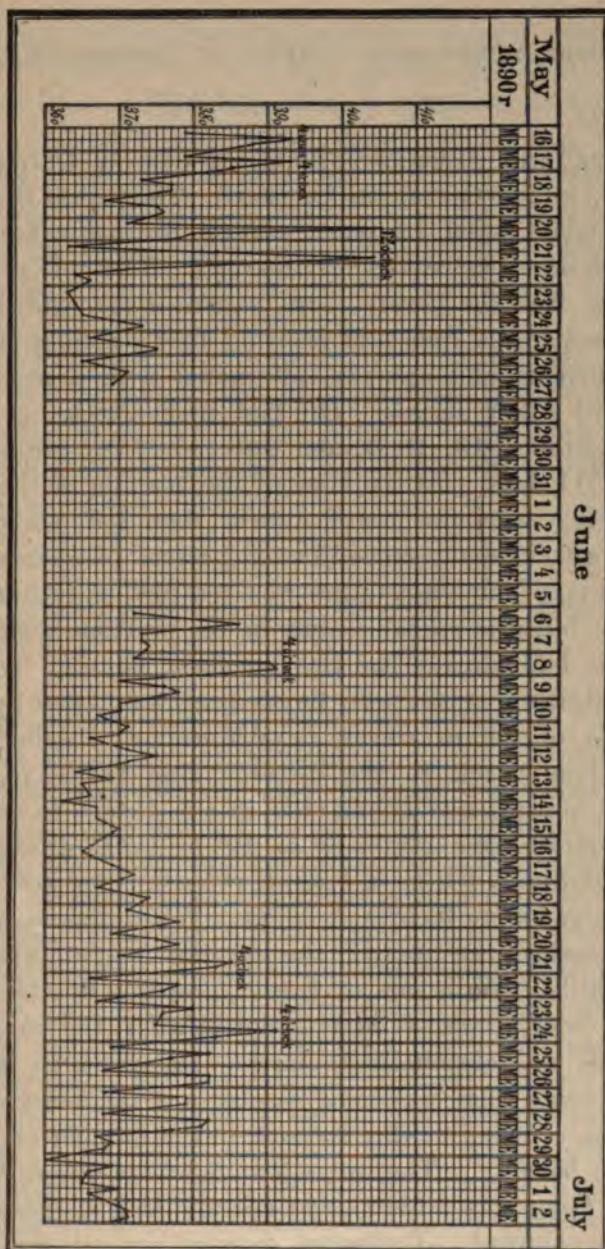


CHART IN A CASE OF GLAND FEVER.
(*Jahrbuch für Kinderheilkunde.*)

CHRONIC ALTERNATING PYREXIA IN PSEUDOLEUKARIA.

(From the ANNALS for 1888.)

Ebstein⁷ read a paper entitled "A Case of Chronic Recurrent Fever; a New Infectious Disease." The illness began in the patient, a male, aged 19 years, without distinct cause, and the time of the onset was not clearly marked. The only symptom of the disease was the fever. The patient had feverish attacks, which ceased after a time and recurred after a definite interval, so that the pyrexia and apyrexia alternated with a regularity not seen in any other disease. He had nine attacks of this kind between October 13, 1886, and July 11, 1887,—that is, in a period of 211 days. At the time of the reading of the paper he was suffering with the tenth attack, then not yet completed. This last attack was preceded by an interval of apyrexia lasting thirteen days. The temperature was recorded only from November, 1886; but it is probable that in the previous September and October he had already had two attacks. Each of these lasted, as a rule, thirteen or fourteen days, being succeeded by a period of apyrexia of ten or eleven days' duration; so that from the height of one attack to the corresponding period in the next attack the interval was about twenty-four days. In each attack the temperature rose gradually to 40° or 41° C. or even higher, and then gradually fell to subnormal ranges. The lowest temperatures recorded were 35.6° and 36° C. When the morning temperature reached the normal, the evening temperature was still slightly febrile. With one exception, probably due to the occurrence of a brief attack of intercurrent pleurisy, the course of the temperature was absolutely uniform. The patient's intelligence remained clear; there was some weakness of the heart; the blood was normal, showing neither increase in the number of white corpuscles nor bacteria. The lungs and digestive organs were quite healthy. There was neither sugar nor albumen in the urine. The spleen was enlarged. Treatment directed against the fever and consisting of arsenious acid, quinine, and antipyrin, with brandy as a cardiac stimulant, had no effect. About July 7th the fever was almost continuous, and death occurred, with general œdema and coma, on August 14th. The autopsy revealed the lesions of

lymphadenoma of the bronchial, mediastinal, and retroperitoneal groups, with growths in the lungs, pleura, and liver. The case was, in fact, one of Hodgkin's disease, or pseudoleukæmia with an unusual type of pyrexia, which, however, had been previously described by Murchison, Gowers, and Pel. In no other instance on record was the alternating pyrexia so distinctly characterized. A writer in the *Medical News* particularly criticises Ebstein's view, that the case is to be regarded as a new infectious disease, and also his title of chronic relapsing fever.

Pel¹⁸⁸ replied to Ebstein, regretting that the latter had taken no notice of two other cases which he had published in 1886, which closely resembled Ebstein's case. Pel does not think the disease entitled to a new name. He calls it an extremely infectious form of pseudoleukæmia.

INTERMITTENT FEVER OF HYSTERICAL ORIGIN.

(From the ANNUAL for 1894.)

Coquet, of Bordeaux, ¹⁸⁸ _{Sept.} has reported the case of a woman, 28 years old, in whom, after an emotional disturbance during the menstrual period, menstruation was suppressed and violent headache appeared, with intense epigastric pain, to which vomiting became superadded. Soon it was observed that paroxysms of chill, fever, and sweating occurred regularly, at first on alternate days and subsequently on every third day. These attacks were followed by drowsiness, but the sleep was restless and disturbed, the patient talking a good deal. These symptoms had persisted for some three months, despite the administration of quinine. When the patient came under observation the possibility of hysteria at once suggested itself, and on careful search several stigmata were found. It was learned that, three years previously, following an operation upon the nose, there had been a similar disturbance of sleep, with febrile manifestations. The arch of the palate was rather pointed and the pharynx was anæsthetic. The lobule of the ear was adherent to the adjacent tissues. There were painful points below the breasts and over the ovaries. The visual fields were not restricted. Therapeutically, potassium bromide was administered during the day and bread-pills half an hour before the usual time

for the occurrence of the paroxysm of chill, fever, and sweating. Under this treatment excellent progress was made, and the cure was finally rendered complete after the giving of a course of douches.

HECTIC FEVER.

(From the ANNUAL for 1888.)

Pribram²⁰ treated hectic fever with ounce doses of a 1-per-cent. solution of antipyrin, followed by half-ounce doses of the same solution every hour until the temperature fell to normal. Two doses usually proved sufficient. If the 1-per-cent. solution seem strong enough, it should be continued in the same manner for four or five days. If not, a 1½- or even a 2-per-cent. solution should be used. On the sixth or seventh day omit the second dose. If three doses have been given daily, omit the third. After a few days longer drop the second. He claims excellent results.

BRASS-WORKERS' FEVER.

(From the ANNUAL for 1899.)

Simon²¹ published an essay on "Brass-workers' Diseases," and especially the so-called ague of brass-workers. He found, on inquiry among those who have suffered from this disease, that the sequence of cold, hot, and sweating stages was never present, and that there was no relationship with malarial ague. He thinks the symptoms such as would be caused by ingestion of a quantity of irritating metal sufficiently large to cause vomiting and its attendant depression, and that the name "brass-workers' ague" should not be continued, as being wrongly suggestive and misleading.

QUININE FEVER.

(From the ANNUAL for 1894.)

Krannhals²² has reported the case of a woman, 22 years old, in whom the administration of 0.2 grammie (3 grains) of quinine was followed by elevation of temperature, haematemesis, bloody stools, and marked prostration. The patient was quite well on the following day. A week later the administration of 0.2 grammie (3

grains) of quinine was again followed by a similar train of symptoms. After the lapse of several weeks 0.2 grammes (3 grains) of quinine were, with the consent of the patient, again experimentally administered, with the same results as followed the previous administrations. Rulle ²¹ _{Apr. 1} also refers to a case in which the administration of 0.65 grammes (10 grains) of quinine was followed by an elevation of temperature to 40° C. (104° F.), together with the appearance of an evanescent rash.

A NEW ERUPTIVE FEVER.

(From the ANNUAL for 1890.)

Coltman, corresponding editor, ⁶⁷³ _{Sept.} describes a new eruptive fever that he observed in Chinanfoo, China. The patients had been previously affected with small-pox. For three days fever was manifested. On the third day small red spots appeared, first on the wrists, soon after on the face, after which the fever gradually fell, and in two days more, or by the fifth day, it had entirely disappeared. The eruption steadily spread over the entire body, maintaining a discrete form. It reached its height on the seventh day, at which time the papules were about the size of a pea, round as a bullet, and perfectly white. On opening several of them they were found to contain a perfectly clear albuminous fluid. They then seemed to dry up, and in eight days more were all like little white, hard shot, resting upon an indurated base. The eruption was at no time pustular, umbilicated, or inflammatory. As the papules dropped off they left a dark-blue base, still raised above the surrounding skin. The Chinese make no distinction between this affection and small-pox, which probably accounts for the numerous attacks of small-pox in the same subject within a few months, to which they allude.

MALIGNANT FEVER OF BRAZIL.

(From the ANNUAL for 1890.)

Toppin ⁶ _{May 25} reports two cases of a fever occurring at Rio Janeiro, which he believes has not yet been properly named, and which, in its malignancy, outrivals any fever he has ever seen or heard of. A passenger from England to Buenos Ayres

went ashore in Rio, and in about half an hour was brought back in a comatose condition, with a temperature of 110° F. (43.33° C.), and died within an hour. Before going ashore he had been in good health, but soon after landing complained of pain about the epigastrium, and in a few minutes became delirious and then comatose. He had been in the Tropics before,—in India and other climates even hotter than the Brazils,—and was more inclined to be anæmic than plethoric. The author applied ice to his head, sponged him with iced water, administered enemata of magnesium sulphate and water, made subcutaneous injections of antipyrin and quinine, and applied sinapisms to the spine and to the calves of the legs; but all to no purpose, there being no variation in the temperature, which remained high for some little time after the man was dead. The next case was that of W. H., aged 41, a first-class passenger from Montevideo to England, who came under treatment on the night of April 7th for something to open his bowels. Two podophyllin pills, followed next morning (April 8th) by a dose of Seidlitz powder, had no effect. It turned out that his bowels had not moved for several days, but otherwise he was what would be called a fairly healthy man. He had been dancing and playing cricket on deck only the day before, and had taken the precaution of not going ashore. Finding that the pills had no effect, Toppin gave him 2 glycerin suppositories of 30 drops each, and later 2 ounces of castor-oil *per rectum*. As none of these had moved his bowels, and as he had in the evening a temperature of 102° F. (38.88° C.), he was then given a mixture containing 1 drop of croton-oil and 5 drops of oil of peppermint; this moved the bowels three times. At 3 A.M. on the following morning (April 9th) he had a temperature of 105° F. (40.55° C.); the skin was very hot and dry, and the pulse 120, full, and strong. The only thing he complained of was great weakness of the legs. He had no headache or pain anywhere, and could keep his legs stretched out with as great ease as in any other position. He had no lenticular rose-spots, gurgling or wincing on pressure over the right iliac region, or other sign of enteric fever. The author mentions this because fever was said to be prevalent at Montevideo, where he lived. His kidneys were not acting very well, and the urine, when examined, was found to be albuminous. Antipyrin was administered in 20-

grain (1.30 grammes) doses, increased to 30-grain (2 grammes) doses, at intervals of something less than an hour, for hours, without any perceptible effect on the state of the patient or diminution of the temperature. [Rather dangerous doses.—Ebs.] Until a few hours before death the patient's mind was clear, although there was a tendency to delirium. Twenty grains (1.30 grammes) of quinine were given, followed by a mixture containing spirit of nitrous ether and nitrate of potash, without in any way lessening the temperature. Cold sponging of the surface of the body was also tried. Fairbairn, of Rio, was called in for consultation, and he pronounced the case to be one of yellow fever. At about 1 P.M. the fatal symptoms exhibited themselves,—black vomit, hiccoughs, and subsultus tendinum. He had been covered with prickly heat; this now disappeared, and his skin became paler than usual, but there was no jaundice whatever. He soon became comatose, and died at 3 P.M., the body quickly turning a bluish black in mottled patches. Toppin remarks that the disease appears to be, like yellow fever, non-contagious, for the wife of the patient, who was quite overcome with grief, was in the cabin the whole time, and wiped his mouth with her own handkerchief; two or three other people were also in and out of the room. Whether it could be caused by the same morbid influence as yellow fever, acting on peculiar constitutions, is a question he leaves to those who are better able to decide; but the fearful rapidity and fatality of the disease, the absence of pain and jaundice, combined with the fact that the mortality from the ordinary cases of yellow fever during the epidemic has been much below the average, would, he thinks, point to its individuality. The blood seems to be so completely and quickly disorganized that treatment is of little avail.

FEVER AT KANSAS CITY.

(From the ANNUAL for 1890.)

Lanphear¹⁰² has a paper entitled "Have We an Undescribed Disease to Treat?" This disease prevails in certain localities of Kansas City, and has been called typhoid, typhomalarial, continued malarial, or cerebro-spinal. He saw several cases in one locality in the summer of 1887. The disease in these cases was ushered in with a severe chill, the only one. The

temperature rose to 104° or 105° F. (40° or 40.55° C.). There was constant headache till near the end of the disease; the tongue was moist and clean. There was considerable vomiting, with little nausea. It seemed to be cerebral in origin. Slight jaundice was noticeable. The urine was dark and ammoniacal, containing albumen, but no casts. Herpes and purpura were present. Pain in the muscles of the back and lower extremities, particularly in the gastrocnemius, was a constant symptom in all the cases. Motion aggravated the pain. The pulse was not much increased in frequency, ranging from 80 to 90, and was soft. There was no abdominal symptom. The disease seemed to be infectious, and prevailed in summer in these cases. Post-mortem examination revealed little, except slight inflammation of the common bile-duct and congestion or inflammation of the kidneys. There was no sign of disease of the intestines peculiar to typhoid fever. The gastrocnemius muscle was infiltrated with what appeared to be serum. He thinks the site of irritation is in the ganglionic nervous system, the cerebro-spinal system being affected through sympathy only. His cases could not have been enteric, having had none of the symptoms. "They were also entirely dissimilar to intermittent fever, and the symptoms could be readily distinguished from those of malarial fever. Cerebro-spinal fever is the only one with which this disease could possibly be confounded, but the latter is much more grave. The symptoms approximate a disease known and described as 'Weil's disease,' which it possibly is. The tendency is to recovery." The treatment of these cases was that usually advised in fevers.

FEVER ON AN EMIGRANT-SHIP.

(From the ANNUAL for 1890.)

Kraft³⁶⁹ reports an epidemic of febrile disease observed upon an emigrant-ship, voyaging from Norway to Honolulu, in the winter of 1880-81. It began with symptoms of severe chill, or like a mild enteric fever without nervous symptoms. The first stage lasted three or four days, after which were manifested great debility, loss of appetite, elevation of temperature to 39.5° or 40.5° C. (103° or 105° F.), with morning remissions. Physical examination of the chest showed nothing abnormal; sensorium,

stools, and urine were normal ; the tongue was clean ; no exanthem was present. The spleen was not examined. Some patients recovered in about ten days ; others were sick for weeks, recovering with a gradual defervescence resembling that of enteric fever, or dying with symptoms of heart-failure. One patient was jaundiced two days before death. Sequelæ did not appear. Twice as many females as males were affected. The first patient was attacked about two months after leaving port. The disease might have been confounded with enteric fever, acute miliary tuberculosis, and pyæmia. The author, however, concludes that it was none of these, and finds nothing in literature resembling it. It may be, he thinks, the "ship fever" of which old sailors speak. [But is that not typhus ?]

PLEURO-PNEUMONIC FEVER.

(From the ANNUAL for 1890.)

Ballard ²² publishes an interesting report of an epidemic of so-called pneumonia at Middlesborough, which has resulted in the discovery of a specific affection to which he gives the name of "pleuro-pneumonic fever." At the outset of his inquiry he found that the fatality of the disease had been abnormally high, and that some of the local doctors regarded it as a new disease, whilst by the laboring classes its causation was put down to the inhalation of slag-dust. The epidemic lasted six months, and a curious point in connection with it was that the mortality amongst males was fourfold that amongst females. Its relation to age was also striking, the mortality at ages above 15 years being five times the mean of eight previous years, and that at ages above 45 five and a half times the mean. It was a very fatal disease, the mortality being over 20 per cent. at all ages and nearly 30 per cent. over 15 years. Ballard thus describes the chief clinical symptoms : Invariable commencement by rigors, pains in the side, increase of temperature, rapid pulse, dyspnoea, vomiting, and delirium. The cough was trifling, the sputa "prune-juice," and physical signs of pleuro-pneumonia were easily developed, being either single or double. Relapses were frequent. Death occurred between the third and fifth days, and fatal cases seldom lived a week. In recoveries crises occurred between the seventh and tenth days, and embolic sequelæ often occurred. Pathological appearances

included lobar pneumonia; pleural effusion; defibrinated clot in the right heart, but strongly fibrinated clot in the left cavities; pulpy spleen; ecchymoses in the stomach. Further, Klein found a specific bacillus in the fresh lung-juice and in fresh sputum. Ballard considers this disease as a fever in the same way as typhus, enteric, and relapsing are considered to be fevers. Though hitherto unrecognized, he has some evidence of its existing elsewhere. He has strong proof of its infectious nature, by medium of individuals, specifically infected drains, and infected food, which he undertakes to produce. The inhalation of slag-dust and other kinds of dust he regards as a predisposing cause, only ranking with chills, bodily fatigue, and the like. General conditions of sanitary unwholesomeness also assisted in its spread and intensified its acuteness. In conclusion, Ballard urges sanitary authorities to be on the lookout for this disease and to regard it as an infectious complaint capable of conveyance by the air, sewers, or food. Szontagh ¹⁵⁹ ₁₅₈ reports a case of croupous pneumonia, with perfect intermittent-fever type, in a 6-year-old boy.

TYPHO-MALARIAL FEVER.

(From the ANNUAL for 1893.)

While not maintaining that typho-malarial fever exists as a distinct affection, Comegys, of Cincinnati, ¹⁵⁹ _{Aug.} expresses the view that the type of disease known by that designation presents features that differ from those of typical enteric fever. In typho-malarial fever the febrile movement is of remittent type; cerebral symptoms are not prominent; the appetite is preserved; thirst is present; the tongue is flabby and covered with a white coat; constipation is the rule; the patient is anxious as to the outcome of his illness; tympanites is not marked; abdominal tenderness is slight; pulmonary complications are uncommon; adynamia is not marked; neuralgic pains are often present. Examination of the blood fails to disclose the presence of plasmodia. In treatment a preference for antipyretics is expressed. For intestinal haemorrhage castor-oil is recommended,—a tablespoonful every hour until it appears in the stools. For severe epistaxis injections of water, as hot as can be borne, into and through the nostrils are practiced. Tympanites is controlled by a cold pack over

the abdomen. If meningitis threaten or develop, repeated douches of cold water upon the head for ten or fifteen minutes at a time are employed, and 10 or 15 grains (0.65 to 0.97 grammes) of potassium iodide are given every four hours. A feeble recommendation of the cold bath is made.

ATYPICAL FEVERS.

(From the ANNUAL for 1893.)

Cain, of Nashville, ²⁸⁶ expresses the opinion that there exists in the Southern United States a distinct type of specific fever, bearing no relation to enteric fever, and no similarity beyond the continuous character of the fever; and no relation to malarial fever, which he believes to be dependent upon a septic agency, elaborated in the ground-soil and conveyed into the human system by foods, drinks, and through the inspired atmosphere.

ANOMALOUS FEVER.

(From the ANNUAL for 1894.)

Connolly, of Brisbane, ²⁸⁵ has observed 44 cases of continued fever consequent upon immersion in flood-waters. The main symptoms, besides elevation of temperature, continuing generally for less than a week, were constipation, headache, and backache. In 6 or 7 cases there was jaundice, with clay-colored stools; and in a few cases there was tonsillitis. Two of the cases terminated fatally; both presented jaundice. In almost all of the cases there was a history of prolonged immersion. The condition was more common among males than among females. No form of treatment appeared to have any influence. Jackson ²⁸⁵ observed that small wounds that had been bathed in flood-waters seemed to be prone to a mild form of erysipelas. Hirschfeld ²⁸⁵ reports having found a streptococcus in the excretions from cases of the kind described.



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 79. Sanitarian, New York.
 80. Therapeutic Gazette, Detroit.
 81. Virginia Medical Monthly, Richmond.
 82. Medical Review, St. Louis.
 83. Zeitschrift für physiologische Chemie, Strassburg.
 84. Wiener medizinische Wochenschrift, Vienna.
 85. Texas Courier-Record, Dallas, Tex.
 86. Southern Practitioner, Nashville, Tenn.
 87. Revue médico-pharmaceutique, Constantinople.
 88. Prager medicinische Wochenschrift, Prague.
 89. Archivos de ginecol. y pediat., Barcelona.
 90. Medical Chronicle, Manchester.
 91. Revue de chirurgie, Paris.
 92. Revue de médecine, Paris.
 93. Sanitary Journal, Glasgow.
 94. Archives de neurologie, Paris.
 95. Archiv für Gynäkologie, Berlin.
 96. Annals of Surgery, Philadelphia.
 97. Mesdunarodnaja klinika, Warsaw.
 98. Alienist and Neurologist, St. Louis.
 99. Boston Medical and Surgical Journal.
 100. Gazette des hôpitaux, Paris.
 101. International Journal of Surgery, New York.
 102. Kansas City Medical Record, Kansas City, Mo.
 103. Medical Classics, New York.
 104. Maryland Medical Journal, Baltimore.
 105. Northwestern Lancet, St. Paul, Minn.
 106. Omaha Clinic, Omaha, Neb.
 107. Pacific Record of Medicine and Surgery, San Francisco.
 108. Revue de thérapeutique médico-chirurgicale, Paris.
 109. St. Louis Medical and Surgical Journal, St. Louis.
 110. Texas Health Journal, Dallas, Tex.
 111. União médica, Rio de Janeiro.
 112. University Medical Magazine, Philadelphia.
 113. Wiener medizinische Presse, Vienna.
 114. Zeitschrift für klinische Medicin, Berlin.
 115. Western Medical Reporter, Chicago.
 116. Therapeutische Monatshefte, Berlin.
 117. Southern Medical Record, Atlanta.
 118. Revue mensuelle des maladies de l'enfance, Paris.
 119. Philadelphia Polyclinic.
 120. Nashville Journal of Medicine and Surgery, Nashville, Tenn.
 121. Medical Bulletin, Philadelphia.
 122. L'Union médicale du Canada, Montreal.
 123. Korrespondenzblatt der ärztlichen kreis- und bezirks- Vereine im Königreich Sachsen, Leipzig.
 124. Anti-Adulteration Journal, Philadelphia.
 125. Hall's Journal of Health, New York.
 126. Revue des sciences médicales en France et à l'étranger, Paris.
 127. Gazette médicale de Nantes.
 128. Medical Era, St. Louis.
 129. Dosimetric Medical Review, N. Y.
 130. Canada Medical Record, Montreal.
 131. Bristol Medico-Chirurgical Journal, Bristol, England.
 132. Archives of Gynaecology, New York.
 133. Medicinisches Correspondenz-Blatt des württembergischen ärztlichen Landesvereins, Stuttgart.
 134. The Doctor of Hygiene, New York.
 135. The Analyst, London.

136. *Revue de laryngologie, d'otologie et de rhinologie*, Paris.

137. *Practice*, Richmond, Va.

138. *New England Medical Monthly*, Bridgeport, Conn.

139. *Medical Standard*, Chicago.

140. *Annali de freniatria*, Torino.

141. *Herald of Health*, London.

142. *Gazette médicale de l'Algérie*, Algiers.

143. *Texas Medical Journal*, Austin, Tex.

144. *College and Clinical Record*, Philadelphia.

145. *Revista de medicina y farmacia*, Paris.

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150. *Medizinische Monatsschrift*, N. Y.

151. *Epitome of Medicine*, New York.

152. *La France médicale et Paris médical*, Paris.

153. *Journal d'hygiène*, Paris.

154. *Gazette de gynécologie*, Paris.

155. *Denver Medical Times*, Denver, Col.

156. *Chemist and Druggist*, London.

157. *Brooklyn Medical Journal*, Brooklyn.

158. *Archiv für Kinderheilkunde*, Stuttgart.

159. *Sanitary News*, Chicago.

160. *Revue médicale de Toulouse*.

161. *Pittsburgh Medical Review*, Pittsburgh.

162. *Nouvelles archives d'obstétrique et de gynécologie*, Paris.

163. *Medical Missionary Record*, New York.

164. *La tribune médicale*, Paris.

165. *Journal de l'anatomie et de la physiologie normales et pathologiques de l'homme et des animaux*, Paris.

166. *Journal of Mental Science*, London.

167. *Druggists' Bulletin*, Detroit.

168. *Gazette médicale de Strasbourg*, Strasbourg.

169. *Centralblatt für die gesammte Therapie*, Vienna.

170. *Buffalo Medical and Surgical Journal*.

171. *Annales d'oculistique*, Paris.

172. *Sanitary Era*, New York.

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175. *Nice-médical*, Nice.

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179. *Gaceta médica de México*.

180. *Centralblatt für die gesammte Medizin*, Leipzig.

181. *Bulletin médical du nord*, Lille.

182. *Archiv für Physiologie*, Leipzig.

183. *Sanitary Inspector*, Augusta, Me.

184. *Revue médicale de l'est*, Nancy, France.

185. *Physician and Surgeon*, Ann Arbor, Mich.

186. *Medical World*, Philadelphia.

187. *Liverpool Medico-Chirurgical Journal*, Liverpool.

188. *Journal de médecine de Bordeaux*.

189. *Gesundheit*, Frankfurt a. M.

190. *Centralblatt für praktische Augenheilkunde*, Leipzig.

191. *Journal de la santé publique*, Paris.

192. *Chicago Medical Times*.

193. *Moniteur de thérapeutique*, Paris.

194. *Bulletins et mémoires de la Société obstétricale et gynécologique*, Paris.

195. *Archives de médecine navale*, Paris.

196. *Southern Clinic*, Richmond, Va.

197. *Revue médicale de la Suisse romande*, Geneva.

198. *Progress*, Louisville, Ky.

199. *Medical Brief*, St. Louis.

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202. *Medical Age*, Detroit.

203. *La normandie médicale*, Rouen.

204. *Archiv für Ophthalmologie (Gräfe)*, Leipzig.

205. *Centralblatt für allgemeine Gesundheitspflege*, Bonn.

206. *Indian Medical Gazette*, Calcutta.

207. *Atlanta Medical and Surgical Journal*.

208. *Revue scientifique*, Paris.

209. *Pharmaceutische Zeitschrift für Russland*, St. Petersburg.

210. *Medico-Legal Journal*, New York.

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222. *Cleveland Medical Gazette*, Cleveland, Ohio.

223. *Bulletin de la Société des médecins et naturalistes de Jassy*, Roumania.

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225. *Le Poitou médical*, Poitiers.

226. *Archiv f. klinische Chirurgie*, Berlin.

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228. *La Loire médicale*, Saint-Etienne.

229. *Journal of Medicine and Dosimetric Therapeutics*, London.

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232. *Gazette médicale d'Orient*, Constantinople.

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234. *American Lancet*, Detroit.

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243. *Archives de médecine et de pharmacie militaires*, Paris.

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248. *Journal of Morphology*, Boston.

249. *Archives of Ophthalmology*, New York.

250. *Archives de l'anthropologie criminelle et des sciences pénales*, Paris.

251. *Annals of Hygiene*, Philadelphia.

252. *Zeitschrift für Medicinalbeamte*, Berlin.

253. *Journal d'oculistique et de chirurgie*, Paris.

254. *Archiv für Augenheilkunde*, Wiesbaden.

255. *Jäger's Monattsblatt*, Stuttgart.

256. *Journal d'accouchements*, Liége.

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258. *Medical Temperance Journal*, London.

259. *Clinica Chirurgica*, Milan.

260. *American Monthly Microscopical Journal*, Washington, D. C.

261. *Journal of the New York Microscopical Society*, New York.

262. *Annales de l'Institut Pasteur*, Paris.

263. *American Journal of Psychology*, Worcester, Mass.

264. *Nursing Record*, London.

265. *Centralblatt für Physiologie*, Vienna.

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267. *Australasian Medical Gazette*, Sydney.

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273. *Archiv für experimentelle Pathologie und Pharmacie*, Leipzig.

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281. *Medical Advance*, Chicago.

282. *Montreal Medical Journal*, Montreal.

283. *Allgemeiner Wiener medizinische Zeitung*, Vienna.

284. *Maritime Medical News*, Halifax, N. S.

285. *Australian Medical Journal*, Melbourne.

286. *Archives internationales de laryngologie, de rhinologie et d'otologie*, Paris.

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289. *Archives roumaines de médecine et de chirurgie*, Paris.

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300. *Annales de physiologie, normale et pathologique*, Paris.

301. *Deutsche Zeitschrift für Chirurgie*, Leipzig.

302. *Jahrbuch für Morphologie*, Leipzig.

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304. *La province médicale*, Lyons.

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307. *L'impartialité médicale*, Paris.

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309. *Charité-Annalen*, Berlin.

310. *Jahrbuch für praktische Aerzte*, Berlin.

311. *Vierteljahrsschrift für gerichtliche Medicin und Sanitätswesen*, Berlin.

312. *Monatshefte für Ohrenheilkunde*, Berlin.

313. *Monatshefte für Anatomie und Physiologie*, Berlin.

314. *Zeitschrift für Psychiatrie und gerichtliche Medicin*, Berlin.

315. *Archiv für Pathologie und Physiologie*, Berlin.

316. *Anatomischer Anzeiger*, Jena.

317. *Centralblatt für Gynäkologie*, Leipzig.

318. *Anzeiger über Novitäten und Antiquar der Medicin*, Leipzig.

319. *Centralblatt für klinische Medicin*, Leipzig.

320. *Archiv für Anatomie und Physiologie*, Leipzig.

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322. *Archiv für Anthropologie*, Braunschweig.

323. *Mittheilungen aus der ophthalmologischen Klinik in Tübingen*.

324. *Archiv für Hygiene*, Munich.

325. *American Analyst*, New York.

326. *Deutsches Archiv für klinische Medicin*, Leipzig.

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330. *Médecin clinicien*, Paris.

331. *Der praktische Aerzt*, Wetzlar.

332. *Oesterreichische Badezeitung*, Vienna.

333. *Blätter für Gesundheitspflege*, Berlin.

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336. *Centralblatt für Chirurgie*, Leipzig.

337. *Quarterly Journal of Inebriety*, Hartford, Conn.

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339. *Detroit Emergency Hospital Reports*, Detroit.

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355. Revista de terapéutica y farmacia, Madrid.

356. Archives de biologie, Gand.

357. Therapeutische Blätter, Vienna.

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359. Journal de pharmacie et de chimie, Paris.

360. Archives générales de médecine, Paris.

361. Annales médico-psychologiques, Paris.

362. Répertoire de pharmacie, Paris.

363. Gazette hebdomadaire de médecine et de chirurgie, Paris.

364. Medical Fortnightly, St. Louis.

365. Centralblatt für die medicinischen Wissenschaften, Berlin.

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367. Irrenfreund, Heilbronn.

368. Archiv für Psychiatrie und Nervenkrankheiten, Berlin.

369. Norsk magazin for lægevidenskaben, Christiania.

370. Hygiea, Stockholm.

371. Nordiskt medicinskt arkiv, Stockholm. [sala.

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373. Hospitals-tidende, Copenhagen.

374. Bibliothek for læger, Copenhagen.

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376. Lo sperimentale, Florence.

377. Gazeta médica de Granada.

378. Gazette médicale de Liége.

379. Braithwaite's Retrospect, New York and London.

380. Giornale per le levatrici, Milan.

381. Morphologisches Jahrbuch, Leipzig.

382. Wiener Klinik, Vienna.

383. Memorabilien, Heilbronn.

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385. Monatschrift für Ohrenheilkunde, Berlin.

386. Deutsche Vierteljahrsschrift für öffentliche Gesundheitspflege, Braunschweig.

387. Jahresbericht über Leistungen und Fortschritte der Ophthalmologie, Tübingen.

388. British Guiana Medical Annual and Hospital Reports, Georgetown.

389. Bulletin de la Société d'ethnographie, Paris.

390. Deutsches Wochenblatt für Gesundheitspflege und Rettungswesen, Berlin.

391. Zeitschrift für Biologie, Munich.

392. Medizinisch-chirurgisches Rundschau, Vienna.

393. Zeitschrift für Geburtshilfe und Gynäkologie, Stuttgart.

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395. Jahrbuch für Psychiatrie, Berlin.

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398. Journal of the Anthropological Institute of Great Britain and Ireland, London.

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408. *St. Bartholomew's Hospital Reports*, London.

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411. *Der aerztliche Practiker*, Berlin.

412. *St. George's Hosp. Reports*, London.

413. *L'Art médical*, Paris.

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415. *Courrier médical*, Paris.

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419. *Bulletins et mémoires de la Société de chirurgie*, Paris.

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433. *Concours médical*, Paris.

434. *Gazette des Eaux*, Paris.

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441. *Revista de sanidad militar*, Madrid.

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443. *Revue d'hygiène et de police sanitaire*, Paris.

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459. *Cronica médico-quirúrgica de la Habana*.

460. *Archivio per le scienze mediche*, Torino.

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594. La correspondencia médica, Madrid.

595. Ciencia médico-escolástica, Barcelona.

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576. Gesundheits-Ingenieur, Munich.

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580. Revue sanitaire de la Province, Bordeaux.

581. Pharmaceutical Record, London.

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583. Nederlandsch Tijdschrift voor Geeseksunde, Amsterdam.

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585. Revue scientifique et administrative des médecins des armées de terre et de mer, Paris.

586. Wratsch, St Petersburg.

587. Répertoire de thérapeutique, Paris.

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589. Riforma medica, Naples.

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591. Rivista sperimentale di freniatria e di medicina legale in relazione con l'antropologia e le scienze giuridiche e sociali, Reggio-Emilia.

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595. Zeitschrift für Geburtshilfe und Frauenkrankheiten, St. Petersburg.

596. Rivista clinica e terapeutica, Naples.

597. Bulletin de la Société médicale de l'Yonne, Auxerre.

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603. Revue d'anthropologie, Paris.

604. Il raccoglitore medico, Forli.

605. Archivio di psichiatria, scienze penali ed antropologia criminale, Torino.

606. L'Homme, Paris.

607. Revista especial de oftalmología, sifilografía y dermatología, Madrid.

608. Revue internationale scientifique et populaire des falsifications des denrées alimentaires, Amsterdam.

609. Archiv für Anatomie und Entwicklungsgeschichte, Leipzig.

610. La medicina contemporánea, Madrid.

611. Medical Current, Chicago.

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614. Giornale di farmacia, di chimica e di scienze affini, Torino.

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616. Gazzetta medica lombarda, Milan.

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618. Crónica médica de Valencia.

619. Revista médico-farmacéutico de Aragón, Zaragoza.

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621. Ejenedelnaya, St. Petersburg.

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624. Bollettino delle malattie dell' orecchio, della gola e del naso, Florence.

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626. Annales de la Société d'hydrologie médicale de Paris.

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629. La medicina preventiva ; Gazzetta mensile d'igiene clinica e terapia, Naples.

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632. Revista de medicina y cirujía prácticas, Madrid.

633. Revista de laringología, otología y rinología, Barcelona.

634. Revista médica de Sevilla.

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1001. Blätter für klinische Hydrotherapie und verwandte Heilmethoden, Vienna.

1002. Giornale speciale di Farmacia Sperimentale e chimica clinica, Naples.

1003. Amer. Gynæcological Jour., Toledo.

1004. Archives d'obstétrique et de gynécologie, Paris.

1005. Deutsche Zeitschrift für Nervenheilkunde, Heidelberg.

1006. Journal of Comparative Neurology, Granville, Ohio.

1007. Ophthalmic Record, Nashville, Tenn.

1008. Monatshefte für Chemie.

1009. Giornale del Assoc. Napolitana di Med., etc.

1010. Climatoterapia, Barcelona.

1011. Fortschritte der Geburtshilfe und Gynækologie, Wiesbaden.

1012. Therapeutic Review, New York.

1013. International Clinics, Philadelphia.

1014. Boletin de sanidad militar, Buenos Ayres.

1015. Annales d'hypnologie et de psychiatrie, Paris.

1016. Anales del departamento nacional de higiene, Buenos Ayres.

1017. American Dermatologist, Indianapolis.

1018. Annals of Ophthalmology and Otology, Kansas City.

1019. Bulletin of Pharmacy, Detroit.

1020. Gaceta Medica Quezalteca, Quezaltenango, Guatemala.

1021. Bibliographie der klinischen Helminthologie, Munich.

1022. Gli' Incurabili, Giornale di Clinica e di Terapia, Naples.

1023. L'Ingegnaria sanitaria, Torino.

1024. Boletin del hospital general de Puebla.

1025. Bulletin de médecine et de pharmacologie d'Athènes.

1026. International Centralblatt für die Phys. und Path. der Harn und Sexualorgane.

1027. Chicago Medical Journal.

1028. Dental Office and Laboratory, Philadelphia.

1029. Eurèka. *Revue scientifique et industrielle*, Paris.

1030. Medical and Surgical Record, Madison, Neb.

1031. New York Medical Examiner.

1032. National Popular Review, San Diego, Cal.

1033. The Prescription, Danbury, Conn.

1034. Revue chirurgicale, Paris.

1035. Revue de thérapeutique générale et thermale, Paris.

1036. Wochenschrift für Chemie und Pharmacie.

1037. Bulletins de la Société française d'hygiène, Paris.

1038. Le Languedoc Médical, Toulouse.

1039. Annali di nevrologia, Naples.

1040. Internationale Beiträge zur wissenschaftliche Medicin.

1041. Tidsskrift f. Sundhedspleje.

1042. Annales de chirurgie, Paris.

1048. Archives provinciales de chirurgie.

1044. Revue du Dispensaire du Louvre, Paris.

1045. La Roumanie Médicale, Bucharest.

1046. Utchenyia Zapiski Kasanskaho Veterinarnaho Instituta.

1047. Pharmaceutische Centralblatt.

1048. Practitioners' Monthly, Syracuse, N. Y.

1049. Zeitschrift des allgemeinen österreichischen Apotheker-Vereines, Vienna.

1050. Revista de la Sociedad medica Argentina, Buenos Ayres.

1051. Revue de la Tuberculose, Paris.

1052. Chicago Medical Recorder.

1053. Bulletin of the Harvard Medical School Association, Boston.

1054. New Albany Medical Herald, New Albany, Ind.

1055. Indian Medical Reporter, Calcutta.

1056. Hygieia, Stuttgart.

1057. Journal d'hygiène populaire, Montreal.

1058. Food, New York.

1059. Chicago Lancet.

1060. Climates and Resorts, Chicago.

1061. Archives d'électricité médicale, Bordeaux.

1062. Revista de Higiene, Bogotá.

1063. Charlotte Medical Journal, Charlotte, N. C.

1064. The Corpuscle, Chicago.

1065. Florida Medical and Surgical Reporter.

1066. La Revista Médico-Quirúrgica, New York.

1067. The Alkaloid, Chicago.

1068. Tablettes mensuelles de la Société royale de médecine publique de Belgique, Bruxelles.

1069. The Medical Press, New York.

1070. Health and Home, Louisville, Ky.

1071. Revue Théorique et Pratique des Maladies de la Nutrition, Paris

1072. Ontario Medical Journal, Toronto.

1073. Journal of State Medicine, London.

1074. Psychiatrische Jahrbücher.

1075. New York Polyclinic.

1076. Am. Jour. of Surg. and Gynæcology, Kansas City.

1077. The Clinical Journal, London.

1078. Yüjno-Russkaia Meditzinskaia Gazzeta, Odessa.

1079. Sanative Medicine, Westerville, O.

1080. Chicago Clinical Review.

1081. Revista médico-social, Madrid.

1082. Budapest Hygienischer Zeitung.

1083. Revue médicale de la Franche-Comté.

1084. Aerztliche Rundschau.

1085. Archivii ed atti della Società Ital. di Chirurgia.

1086. Medicinsk Revue, Bergen.

1087. Shurnal russkago obschitschestwa ochranenija narodnago sdrawija, St. Petersburg.

1088. Le Midi Médical, Toulouse.

1089. Zeitschrift für Hypnotismus.

1090. Revue Neurologique, Paris.

1091. Leeward Islands Medical Journal.

1092. Indian Medico-Chirurgical Review, Bombay.

1093. Medical Magazine, London.

1094. Boletin del Consejo Superior de Salubridad de Guadalajara.

1095. La Puglia Medica, Bari.

1096. Revue générale de médecine, de chirurgie et d'obstétrique, Paris.

1097. Archivio internazionale delle specialità med. chirurgiche, Naples.

1098. Woman's Medical Journal, Toledo.

1099. Gross Medical College Bulletin, Denver.

1100. Magyar Orvosi Archivum, Budapest.

1101. Archives des Sciences biologiques, St. Petersburg.

1102. Gazzetta Medica di Pavia.

1103. Dental Practitioner, Buffalo.

1104. Le Trimestre Médical, Brussels.

1105. Archivio italiano di otologia, rinologia, e laringologia, Turin.

1106. La Médecine Nouvelle, Paris.

1107. Annales für Hydrographie, Berlin.

1108. Abeja Medica, Havana.

1109. Anatomische Hefte, Giessen.

1110. Annales de la Polyclinique de Lille.

1111. Bolétn del Manicomio de San Baudilio de Llobregat, Barcelona.

1112. Electricidad Médica, Barcelona.

1113. Gazzetta medica delle puglie, Bari, Italy.

1114. Gaceta Medica Municipal, Havana.

1115. Heraldo Medico-Farmaceutico, Madrid.

1116. Internationale Monatschrift zur Bekämpfung der Trunksitten, Bremerhaven.	1134. Journal médical de l'Armée, Athens
1117. L'Univers Médical, Paris.	1135. St. George's Hospital Gazette, London.
1118. La Higiene, Havana.	1136. Northumberland and Durham Medical Journal, England.
1119. Medicinische Novitäten, Leipzig.	1137. Rhode Island Medical Science Monthly, Providence.
1120. Odontoskop, Budapest.	1138. St. Joseph Medical Journal, St. Joseph, Mo.
1121. Prensa Medica de Malaga.	1139. Journal de Chirurgie et de Thérapeutique infantile.
1122. Veshukdorpon (Mirror of Medicine, Bengali), Calcutta.	1140. Hospital Bulletin of the Second Minnesota Hospital.
1123. Western Medical Record, Chicago.	1141. Balneologische Rundschau.
1124. Wisconsin Medical and Surgical Journal, Waukesha, Wis.	1142. La Pædiatria.
1125. Zeitschrift für Nervenheilkunde, Erlangen.	1143. Boletin de Medicina de Santiago.
1126. Revue internationale de Thérapeutique et de Pharmacologie, Paris.	1144. The Tri-State Medical Journal, Keokuk, Ia.
1127. El Agricultor, Bogotá.	1145. Le Limousin Médical.
1128. Revue Médico-chirurgicale du Brésil.	1146. Chugai Ijishimpo, Tokio.
1129. Annales de l'Institut de Pathologie et de Bactériologie, Bucharest.	1147. Archivis di pharmacologia e terapeutica.
1130. Ungarisches Archiv für Medicin, Budapest.	1148. Gyógysz Kozl, Hungary.
1131. Giornale dello istituto Nicolai, Milan.	1149. Annales de la Polyclinique de Toulouse.
1132. Annales médico-chirurgicales du Cercle médical borain, Paturages.	1150. Mathew's Medical Quarterly.
1133. McCaskey's Clinical Studies, Fort Wayne.	1151. Archiv für Laryngologie.
	1152. Louisville Medical Monthly.
	1153. La Presse Médicale, Paris.





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